FROM THE LIBRARY OF
DR. T. J. PETTIGREW

1/10

29,181/c

The only work of the kind that has proceeded from
Charleston – presented to me by Jas. L. Petigru Esq
of Charleston. — — — July 1837.

In Mr. Russell's Diary of North & South, reference is made to a Mr. Petigru who I doubt not is th
person from whom I rec^d this book as a present accompanied by a communication to ascertai
whether I c^d give him any particulars as to my family & to learn whether he was in any way re
lated to me. –

Vol. 1. p. 170. "Only one of the company, a most lively, quaint, witty old lawyer named Petigru, dissented fro
doctrines of Secession; but he seems to be treated as an amiable, harmless person, who has a weakness o
intellect, or a bee in his bonnet" on this particular manner."

" p. 197. "Dined with Mr Petigru, who had most kindly postponed his dinner party till my return from the plan
& met there Gen^l Beauregard, Judge King & others, among whom, distinguished for their esprit & accomplish
were Mrs King & Mrs Carson, daughters of my host. The dislike, which seems innate, to New England is m
[illegible] only in the form of its expression. It is quite true Mr Petigru is a decided Unionist, but

is the sole specimen of the genus in Charleston, & he is tolerated on account of his rarity. As the witty, pleasant old man trots down the street, utterly unconscious of the world around him, he is pointed out proudly by the Carolinians as an instance of forbearance on their part, & as a proof at the same time of popular unanimity of sentiment."

Begin here

5 7. 11746

K. Y. R.
23 Aug 05
106

NORTH AMERICAN
HERPETOLOGY;

OR,

A DESCRIPTION

OF THE

REPTILES INHABITING THE UNITED STATES.

BY JOHN EDWARDS HOLBROOK, M. D.

PROFESSOR OF ANATOMY IN THE MEDICAL COLLEGE OF THE STATE OF SOUTH CAROLINA; MEMBER OF THE
ROYAL MEDICAL SOCIETY OF EDINBURGH; CORRESPONDING MEMBER OF THE ACADEMY OF
NATURAL SCIENCES OF PHILADELPHIA; AND OF THE NEW YORK AND
BALTIMORE LYCEUMS OF NATURAL HISTORY.

VOL. I.

PHILADELPHIA:
J. DOBSON, CHESTNUT STREET.
1836.

WELLCOME
HISTORICAL
MEDICAL
LIBRARY

E. G. DORSEY, PRINTER,
LIBRARY STREET.

TO

GEORGE EDWARDS, ESQ.,

OF

CHARLESTON, SOUTH CAROLINA,

THIS WORK IS RESPECTFULLY DEDICATED,

BY HIS NEPHEW,

JOHN EDWARDS HOLBROOK.

PREFACE.

In undertaking the present work I was not fully aware of the many difficulties attending it—indeed they could hardly have been anticipated. With an immense mass of materials, without Libraries to refer to, and only defective Museums for comparison, I have constantly been in fear of describing animals as new that have long been known to European Naturalists. In no department of American Zoology is there so much confusion as in Herpetology. This is to be traced partly to the earlier Naturalists, partly to the practice of describing from specimens preserved in alcohol, or from prepared skins. I have endeavoured to avoid error in this respect, by describing in every instance from the living animal, and often after a comparison of many individuals.

I consider myself fortunate in having secured the assistance of Mr. J. Sera, an Italian by birth, but long resident in the United States, who has caught the character and attitude of the animals with singular felicity. His figures are the more valuable, from being all taken from life.

In presenting the first volume of North American Herpetology, I have to return my thanks to those gentlemen who have aided me in the undertaking—and especially to Dr. Ogier of Charleston, who was associated with me in my dissections, the result of which will be given in the Anatomy of the Genera: to Dr. Wurdeman and Dr. Baron, who have furnished me with many beautiful preparations: to Dr. Ravenel, and to Dr. Geddings of Baltimore, for interesting remarks on many southern Reptiles: to Dr. Harlan, for the use of his Library and Manuscript Notes: to Dr. Binney and Dr. Storer of Boston, and to Mr. Wilkens of New York, for many Reptiles of the northern parts of the United States: to Charles Hammond and Ogden Hammond, Esqrs., of West Chester, New York, who have furnished me with many animals, together with observations on their habits: and to T. L. Ogden, Esq., of Mobile, for animals sent from the southwestern part of the United States. To Professor Troost, of Nashville, I owe many thanks for several new species of Emys, accompanied with valuable observations. Major Le Conte has, with a liberality that distinguishes the true lover of nature, rendered me essential service, in placing at my disposal the use of his notes, and his beautiful drawings of Reptiles, the labour of many years. But above all am I indebted to Dr. Pickering of Philadelphia, who has aided me with his accurate knowledge at every step of the work.

Whatever merit the work may possess, must be determined by Naturalists; my own wishes will be gratified, if I have restored, or given, order to North American Herpetology.

CONTENTS.

Introduction, - - - - - - - - PAGE 9
Organization of Reptiles, - - - - - - - 12
Testudo Polyphemus, - - - - - - - 41
Emys hieroglyphica, - - - - - - - 47
—— *megacephala*, - - - - - - - 51
—— *Troostii*, - - - - - - - - - 55
—— *Muhlenbergii*, - - - - - - - 59
Ameiva sex-lineata, - - - - - - - - 63
Anolius Carolinensis, - - - - - - - 67
Scincus lateralis, - - - - - - - - 71
Bufo Americanus, - - - - - - - 75
—— *clamosus*, - - - - - - - - - 79
Engystoma Carolinense, - - - - - - - 83
Scaphiopus solitarius, - - - - - - - - 85
Rana halecina, - - - - - - - - 89
—— *palustris*, - - - - - - - - 93
—— *sylvatica*, - - - - - - - - 95
—— *ornata*, - - - - - - - - - 97
Hyla versicolor, - - - - - - - - 101
—— *squirella*, - - - - - - - - - 105
Coluber flagelliformis, - - - - - - - 107
—— *Alleghaniensis*, - - - - - - - 111
—— *quadrivittatus*, - - - - - - - 113
—— *erythrogrammus*, - - - - - - - 115
—— *abacurus*, - - - - - - - 119

INTRODUCTION.

Reptiles are vertebrated animals, with lungs, a simple heart, low temperature, slow digestion, and oviparous generation; having neither hair, feathers, nor mammæ.

Naturalists have experienced much difficulty in giving an appropriate name to this great class of animals. Linnæus, observing some of the most remarkable phenomena in the economy of Reptiles—as their being able to live on land or in water—called them amphibia. The term is inappropriate; for it can be applied but to a very small number, as many never approach the water; and few, like the Sirens, can respire in this element;—breathing with lungs, others must approach its surface for atmospheric air. The respiration of young Batrachia is indeed only in water, but they have gills; and when the animal arrives at its perfect state of developement, these disappear, and are succeeded by lungs. An animal, to respire equally well on land or in water, must have both gills and lungs;—gills to breathe in the water, as Fishes, and lungs to respire atmospheric air, as Birds and Mammalia. The Sirens of our rice-fields, and the Menobranchi of the great northern lakes, are the only North American Reptiles that have this structure, and are consequently our only really amphibious animals. However inapplicable the term amphibia may be to these animals, many writers have followed the example of the great Swedish naturalist. Brisson[*] was the first who arranged them under the name Reptiles,[†] which term will be adopted in this work as more indicative of their habits than the word amphibia.

The science which treats of the form, organization, habits, and history of Reptiles, is named Herpetology,[‡] and has been more neglected than all other branches of Zoology; for the study of Reptiles offers difficulties more numerous and insurmountable than those presented by any other class of vertebrated animals. Inhabiting, for the most part, deep and extensive swamps, infected with malaria, and abounding with diseases during the summer months, when Reptiles are most numerous, time is wanting to observe their modes of life with any prospect of success. Regarded, moreover, by most persons as objects of detestation, represented as venomous, and possessed of the most noxious properties, few have been hardy enough to study their character and habits.

Though wanting the gracefulness of form of some Mammalia,—though without the beauty of plumage of some Birds, or the intelligence of others,—though they lack the brilliancy of colour and wonderful instinct of the insect tribe,—still the Reptiles offer many striking points of interest to the student of nature. To one who would trace the chain of organized bodies, their connexion, their relation with each other, and all with the great whole, the study of Herpetology is highly interesting and important; for the Reptiles occupy a prominent place in the scale of creation. Neither the highest, nor yet the lowest of vertebrated animals, they fill a space between the Birds and Fishes, and without them a vast link in the chain of animated beings would be wanting. Elevated above the Fish by the presence of lungs and articulated members, yet inferior to Birds from having cold blood, a simple heart, and a less degree of sensibility, these animals, by their multiplied and extremely diversified forms, make the medium of connexion between beings of the most opposite character. The Testudo connects them with the inferior Mammalia, as with the Armadillo, on the one hand, while the Siren approximates them to the cartilaginous Fishes on the other: Serpents form a link of another series, connecting this class with osseous Fishes, as with the Eel; and the Flying Lizard connects them with the Birds.* In order to estimate properly the rank these animals hold in the scale of creation, it is necessary to examine the general and principal points of their organization—to study the number of their senses, and their degree of perfection; without this, we cannot understand the diversified forms and the shades of life that present themselves in such infinite variety among them. Their conformation and modes of life are so different—some organized for creeping, others for walking, for swimming, and even for flying, that it would be impossible to generalize their anatomical forms or structure;—we cannot give the structure of one as the type of organization in all the others; for their variation in shape and figure is attended with modifications of their internal organs.

---

[*] Regne Animal. divisé, &c. Paris, 1756.

[†] Dumeril observes the term had been previously used by Lyonnet. Hist. Nat. des Rept., tom. i. p. 2.

[‡] From ἑρπετον, a reptile, λόγος, a discourse.

---

* Carus, Vergleich. Zoot. Erst. Theil., p. 25.

ORGANIZATION OF REPTILES.

1. Organs of Integumation.—We find in no other class of animals such a variety of structure in the integuments, their characters differing in almost every genus; horny in the Chelonia, scaly in the Serpents, smooth and soft in the Frogs, warty and tuberculous in the Toads.

The *cuticle* exists in all. In the Tortoises it passes not only over the legs, but over the shell; it covers the scales and plates of Lizards and Serpents; and in all, is detached periodically. This character of shedding the cuticle is most observable in the Serpents, where that structure is detached in the form of an entire covering; in the Batrachia the cuticle is less distinct, resembling a mucous membrane, and being shed in the water, it is frequently devoured by the animal itself. This phenomenon is not confined to the season of spring, as believed by Linnæus, but is influenced by variations of temperature, the health of the animal, &c. I have seen the Coluber guttatus change its skin four or five times during a confinement of as many months.

The *rete mucosum* is placed under the epidermis, and offers every variety of tint and colour, as may be observed in different species of Reptiles; almost every colour may be perceived in it—red, blue, green, yellow, varying in brightness, not only in different individuals, but according to age, sex, &c. These shades are always most remarkable when the skin has been newly cast. The tints in some of the species, as in the Anolius and the Hylæ, change according to the state of excitement in the animal, or the activity of the circulation.

The *dermis*, or true skin, varies a good deal. In the heads of the Chelonia it is only seen as a thin fibrous lamina, closely applied to the bones over which it passes. In the Frogs it is much more distinct, but is loosely connected with the subjacent organs by means of vessels, nerves, &c., the principal points of attachment being at the extremity of the toes, and at the jaws and axilla, the skin, as is remarked by Dumeril,* forms a loose sac, in which the body of the animal is placed.

2. Digestive Organs.—Digestion is the most general, as well as the most necessary function of living animals, both for their existence and the perfect performance of their actions. A continual waste is experienced in the animal economy which must be as constantly supplied. The aliment is the source from which this supply is derived, food being necessary, as well for the restoration of organs as for their developement. But the aliment, of whatever nature it may be, is not at once admitted into the general mass of the circulating fluids; a series of chemical changes are requisite for its perfect elaboration, and to produce these alterations, Reptiles are provided with an alimentary canal. This, like the sac of the zoophyte, is a prolongation or duplicature of the external covering of the body; simple in some, more complicated in others; the kind of food nature has assigned the animal, having an important influence on its internal organization. Almost all Reptiles are carnivorous. Most of them feed on living prey, seizing it when in motion, and swallowing it without mastication. The Anolius, Frogs, Toads, and Hylæ, feed on insects—the Water-snakes, on Tadpoles, Frogs, or small Fish; other Serpents live on Squirrels, Rabbits, or even Birds, which they pursue with great activity along the branches of trees. A few animals only of this class subsist entirely on vegetable food, as the Green Turtle and Gopher.

The alimentary canal begins at the mouth and terminates at the vent, and has several important appendages. The mouth is generally large, the articulation of the lower jaw being placed far back; and many have the power of increasing its capacity, not only by expanding the jaws, but by separating the lateral branches of the inferior maxilla, which are only joined by ligaments.* This structure allows some Serpents to swallow other animals of greater size than themselves. In no animal of this class do we find the mouth provided with fleshy or movable lips, as in the Mammalia; for the thick fleshy covering of the upper jaw in the Trionyx does not seem to perform the office of lips. The shape and arrangement of the jaws, the form and size of the teeth, and the modes in which they are implanted, offer interminable varieties, differing in almost every tribe. In some, the teeth are entirely wanting, as in many Batrachian animals; in the Chelonia, their place is supplied by a horny covering to the jaws; in the Sauria, as in the Alligator, the teeth are most perfect, the bony part being hard, with a very thin enamel;† in Serpents they are disposed so as to lacerate the food, or to hold it and prevent its escape from the mouth. The poison fangs form a curious part of the organization of some Serpents, which will be fully explained hereafter. Frogs and Hylæ have small pointed teeth in the jaws and palate; these are in a rudimental state, and can only be useful in detaining their prey within the mouth. No Reptiles masticate their food; not even the Gopher, which lives on grass and plants; and those of the Chelonia that feed on Shell-fish, only break the shell with their horny mandibles, but do not chew the animal within. As they do not masticate their food, it follows that their salivary organs must be less perfect than in the Mammalia. Instead of single large glands, as in those animals, destined to secrete saliva, we find in Reptiles numerous small follicles disposed about the tongue and mouth, each one pouring out its secretion by its own proper orifice. The secretion is, strictly speaking, rather mucous than salivary; and being very viscid, it is of great use to many in entangling their prey.

---

* Hist. Nat. des Rept., tom. i. p. 68.

The *tongue* in this class of animals, offers the greatest variety, not only as to form and structure, but as to its mode of attachment and powers of motion. In the Chelonia it is short and thick, filling up the lower part of the mouth, and cannot be protruded. In the Serpents it is very long and slender, cleft at the extremity, and can be projected with great rapidity; and like the tongue of some Birds, when drawn within the mouth it is enclosed in a sheath. In Frogs and Toads we find a peculiar arrangement not seen in any other vertebrated animals; the tongue is long, and resembles a valve, the anterior extremity being the fixed point, or that attached to the concavity of the lower jaw, while the posterior extremity is directed towards the glottis, and is cleft and movable. The tongue is here an important organ in obtaining food, for it can be projected suddenly and with great force, and being covered with a viscous matter, the prey adheres to it and is carried to the mouth.

---

* Carus, Vergleich. Zoot. Erst. Theil., p. 153.

† Cuvier, Leçons d'Anat. Comp., tom. iii. p. 110.

The *lingual bone* varies greatly in form and in the disposition of its parts, not only in the different genera, but in the different species of Reptiles. In all, there is a central portion or body, and several processes named cornua, varying in number, in extent, and in arrangement. This bone is moved by certain muscles going to the tongue, to the lower jaw and sternum, and in all, its essential function is to support the tongue and facilitate its motions.*

Pharynx. In general there is no soft or hanging palate to mark the termination of the mouth and beginning of the fauces; nor can we observe any difference of structure in the lining membrane, which, however, presents a number of longitudinal folds that disappear when the organ is distended by food in deglutition. In the Alligator the velum appears in the form of a semicircular fold, and is sufficiently extensive to cover the entrance of the posterior nares.

The *œsophagus* can only be distinguished from the pharynx by its smaller size, and this distinction can only be made when the canal is empty. In Serpents, it is extremely dilatable, allowing the animal to swallow large bodies; and in this class, the folds are most remarkable. In some of the Chelonian animals there are many horny points in the œsophagus, directed backwards or towards the stomach, which may be useful in preventing the escape of food.

---

* Vide Meckel, Deutsches Archiv. für die Physiologie, Viert. Band, p. 223, for an accurate account of the lingual bone in the various tribes of Reptiles.

The *stomach* is in all extremely simple in structure and arrangement. In some it seems a mere continuation of the œsophagus, and it is not always easy to mark the point of separation; in others, as in Frogs and Tortoises, we meet with an enlargement like a sac; this gradually decreases in size, and terminates in the small intestine; its termination being marked externally by a slight contraction, and by the greater thickness of the walls. In many, the parietes of the organ are thin, the muscular coat being delicate; in others, as in the Green Turtle, which feeds on vegetables, the muscular covering of the stomach is remarkably thick and strong, resembling in this structure the gizzards of Birds.

The *gastric juice* is poured out from the inner surface of the stomach, mixes with the food, and produces in it certain chemical changes. This fluid is possessed of several curious properties; as the power of correcting or arresting putrefaction, of coagulating albumen, &c.; but of all these its solvent power is the most remarkable; even the bones of other animals cannot withstand its action. It varies, however, in activity in different genera; in Serpents and Frogs, where the walls of the stomach are thin, it is most abundant, and most active; in the Green Turtle it is much less so, digestion being assisted by the strong coats of the stomach. The numerous experiments of Spallanzani would seem to prove that the gastric juice is only active on such substances as form the natural diet of the animal, since he found that the fluid taken from the stomach of one subsisting entirely on flesh, would not act on vegetable matter, and that the gastric juice of an herbivorous, had no effect on the food of a carnivorous animal, while the same fluid of an omnivorous being, acted equally well on animal or vegetable substances.

The *intestinal canal* is the last portion of the digestive organs, where the greatest change is wrought in the aliment by the admixture of bile and pancreatic juice, and whence the nutritious parts are absorbed into the blood. It is subdivided into small and large intestines, the first or small intestine being of greater length. A circular fold of the small, projecting into the large intestine, often marks the termination of one and the beginning of the other; but this difference of size is not equally evident in all Reptiles. Serpents have the canal nearly of the same dimensions throughout its whole extent, and in the Siren the intestine is small and without these subdivisions. In all, the intestinal canal is short and but little convoluted; it is longer than in Fishes, but shorter than in Birds and Mammalia. The length of the canal corresponding to the nature of the food of the animal, is shortest in the carnivorous, as in the Serpents, longest in those that feed on plants, as in the Gopher. It varies even in the same animal, according to its mode of life. The Tadpole, living on vegetable substances, has the intestinal canal very long; but when the animal becomes a Frog, the character of its food being different, this canal decreases in length; and it is wonderful to observe the ease with which nature changes an herbivorous to a carnivorous animal. In the Turtle, the internal surface is covered with several thin processes, placed longitudinally and close to each other; they are most abundant near the upper portion, where the valvulæ conniventes are found in man, and like them, increase the extent of the absorbing surface. Before the termination of the large intestine at the vent, it enlarges and forms a sac or common cavity, called the cloaca, into which opens the rectum, the urinary, and the sexual organs; another link of organization connecting Reptiles with Birds, as well as with the Mammalia, through the Ornithorhynchus, where the same disposition of parts prevails.*

The *liver* is found here as in all other vertebrated animals, and is of large proportionate size, being subdivided into lobes, of which the right is the larger. In some of the Batrachia, as in the Frogs, it is very large, and consists of three lobes: in Serpents, there is but one lobe of great length. The shape, as well as the position of the organ, varies in different tribes; in some it is placed near, in others more remote, from the stomach. Its colour is dark brown; darker than in the ox.

A *gall bladder*, usually containing bile of a brownish-yellow or greenish colour, with excretory ducts, is found in all Reptiles; and is of smaller proportionate size than in the Mammalia or Birds. In the Chelonia it is intimately connected with the liver, being almost concealed by the right lobe; while in the Serpents it is completely separated from it. The admixture of the bile with the alimentary substance in the small intestine, produces a very important change in the nature of the aliment received into the stomach.

---

* Carus, Vergleich. Zoot. Zweit. Theil., p. 508.

A *pancreas* has been observed in most Reptiles; it is situated near the junction of the stomach with the small intestines, and is a smooth glandular mass, similar in structure to that of the Mammalia, but varying greatly in figure and the number of its excretory ducts. In some there is but one, while in others we find as many as three ducts opening into the small intestines.

A *spleen* exists in all vertebrated animals, the type of its form being the same as in the Mammalia; and we find a successive diminution in its developement to the Fishes, where it is least perfect. It is of small size in the Reptiles, varies much in position, and is often found far removed from the stomach; we find it in some on the right side, in others on the left, but most frequently it is placed in the mesial line, or a little to the left of it.* From its being so much diminished in size, it would seem to follow that the organ is of less importance to this class of animals than to the Mammalia.†

Physiology of Digestion.—The absence of proper organs of mastication and insalivation, together with the short alimentary canal and simple form of stomach in Reptiles, denote their carnivorous habits. As there is no mastication to break down the food, no trituration in the stomach to facilitate digestion, the process being done in most of them by the action of the gastric juice, or the stomach alone on the food, it follows that digestion must be very slow. In some, the food remains for days in the stomach; we have seen a Water-snake (Coluber erythrogaster) vomit a Tadpole, much altered, though not entirely changed in appearance, ten days after it had been swallowed; and other Serpents have been observed to retain their food in this organ, for a much longer period, without completely digesting it. Their slow digestion approximates this class to the inferior animals, as to the Leech, in the stomach of which blood has been found many weeks after it had been swallowed. Most Reptiles are voracious in the early summer months, yet they never destroy more than is necessary for their sustenance, and all have great power of abstinence, far beyond the higher classes. Spallanzani confined Toads in close jars for more than twelve months, at the expiration of which time they were lively and active. We have kept a Trionyx more than a year without food, and Frogs and Serpents eight or nine months.

---

* Dumeril, Hist. Nat. des Rept., tom. i. p. 143.

† Cuvier, Leçons d'Anat. Comp., tom. iv. p. 57.

3. Of the Absorbents.—These vessels are intimately connected with nutrition, their office being twofold; the removal of such materials of the body as have become useless, and the taking up of the nutritious part of the food from the small intestines. Absorbents are found in most parts of the body, having thin transparent parietes, and communicating frequently with the veins.[*] Those arising from the small intestine are named lacteals: they absorb the chyle, and convey it to the venous system; they are not easily recognised, but may be made conspicuous by being injected with mercury. Valves exist in these vessels, but are not so thick and firm as in the Mammalia.[†] In Serpents these vessels are extremely active; they remove every particle of the aliment taken into the stomach that is fitted for nutrition, the entire fœcal matter alone being expelled; and as there is no mastication to disturb the relative position of parts, the hairs, and other indigestible substances, are expelled together in a round mass.[‡] In the Batrachian animals the absorbent vessels are remarkably developed, having ventricles or pulsating

---

[*] Lippi, of Florence, traced them to the vena cava, and Fohmann has demonstrated their communication with many other veins. Anat. Untersuch. Heidelberg, 1821.

[†] Hewson, Phil. Trans. for 1769, p. 178.

[‡] Dumeril, Hist. Nat. des Rept., tom. i. p. 145.

sacs, observed first by Müller of Bonn and then by Panizza,* for the propulsion of the fluid they convey.

4. Organs of Circulation.—In the Zoophytes, and lowest classes of animals, the nutritious parts of the food pass at once from the sac forming their organ of digestion, into the different structures of the body, and become integral parts of the animal; but in the higher classes, another change, besides that of digestion must take place in the aliment—a further process of assimilation must be undergone, before it can nourish the living and organized body. This requires the aid of two different sets of organs, those of circulation and those of respiration; the one set for conveying the blood, the other to complete its assimilation. In Reptiles, the nutritious part of the aliment is taken from the intestinal canal, the great reservoir of food, by the lacteal vessels; it is then introduced through the venous system into the organs of circulation, which vessels are afterwards to carry it to all parts of the body, where it becomes identified with its organs, aiding in their developement, in the restoration of their particles, and affording certain secretions for glands. The organs of circulation in Reptiles vary even more than those of digestion from the type of the Mammalia. In the higher classes of animals we have a double heart; one side for the circulation of venous blood, the other for the circulation of arterial. In the Reptiles we find a simple heart, or the two systems of black and red blood communicating freely with each other.

The *heart* is small in proportion to the body, and is always placed near the respiratory organs, they being so constantly and intimately connected with each other, that it may be said, one set of organs modifies the other. Though producing in all nearly the same results on the blood, the structure of the heart varies in the several orders; great differences being observed even in different genera. In the Chelonian Reptiles it is short and thick, having two auricles, the right being the larger; and one ventricle, with thick muscular walls and several cells, all communicating with the general cavity. In the Sauria the heart is ovoid in shape, similar in its general structure to that of the Chelonia, but more complicated in the arrangement of its parts. In the Alligator there are two ventricles, entirely separate,* so that the venous and arterial blood are only mixed in the sac of the great vessels. In Serpents the heart is of more simple formation; the two auricles open into a single ventricle, subdivided into cavities communicating with each other. In the Batrachia we meet with a remarkable and entirely different arrangement of the heart, unlike that of any other of the class; the organ is single, consisting of a large auricle with thin, and a single ventricle with thicker parietes; a single opening in the auricle communicates with the ventricle, and one opening in the ventricle is common to the arteries. This simple structure of the heart has been denied by Davy† and by Weber:‡ they describe the auricle as subdivided into two cavities by a transparent membrane, which is certainly not the case in any of the American Frogs that I have examined.

---

* Sopra il Sist. Linf. dei Rettili: Pav. 1833. These cavities will be described in our special anatomy of the genera.

Physiology of Circulation.—From this structure of the circulatory organs of Reptiles, it results that only a moiety of the blood of the system can pass to the lungs to be exposed to atmospheric air, while in the Mammalia the whole mass is offered to its influence; and further, that there must be an admixture in the single ventricle of the blood of the two auricles, or of the blood returning from the lungs on one side, and of that portion coming from the body on the other, which has not been carried to the cells of the lungs; and thus a portion only of the whole mass can be decarbonised and fitted for nutrition. Hence we do not observe as great difference in the external appearance of venous and arterial blood in Reptiles, as in the Birds and Mammalia.

5. Organs of Respiration.—No organic body can live without air; neither animal nor plant. Some beings derive it directly from the atmosphere, others from the water; and the respiratory organs vary according to the mode of life of

---

* Hentz, Amer. Phil. Trans., n. s., vol. vii. p. 222.

† Zool. Journal, vol. ii.

‡ Beitrag. von dem Herzen. 8vo. 1833.

the animal: those respiring in water have gills, those breathing in atmospheric air have lungs. The air enters through the trachea into the cells of the lungs, to which the venous blood is carried, and where it undergoes great and important changes, acquiring those properties that fit it for nutrition. "This function connects the animal with the atmosphere by need of respiration, as nutrition connects him with the earth; both are equally important conditions to the manifestation of life; they both, though in different ways, contribute to maintain the constant change of composition in the living body."*

The *lungs* offer the most striking marks of distinction between the Reptiles, Mammalia, and Birds. They are generally of great proportionate size, and are composed of many large vesicles, which offer a strong contrast to the extremely vascular and minute pulmonary cells of the Mammalia. This difference of structure corresponds with the different wants of these animals. In the Mammalia and Birds, it is necessary that all the blood of the body should pass to the pulmonary cells to be exposed to the air, and in these the blood is more abundant; hence we find the lungs composed of an infinitude of minute cells, where the pulmonary artery terminates, and from which the radicles of the pulmonary veins originate. In the Reptiles not more than one-third of the blood circulating in the system is carried to the lungs, to undergo the change from venous to arterial; hence the vessels spent on the lungs are far less numerous than in the higher classes, where they form a beautiful net work. "This difference of structure, produces a difference in the animal, for as respiration imparts to the blood its warmth, its energy, this will, in time, determine the degree of vigour in the animal functions; hence we observe the great force of the powers of motion, the rapidity of digestion, the violence of the passions, in Birds; hence the moderate degree of all these qualities in the Mammalia; and hence again, the inertness, the inactivity, and apparent stupidity of the other classes, as Reptiles and Fishes."† This structure of Reptiles evinces less necessity for a constant and rapid change in their circulating fluids than in the Mammalia and Birds; many can live a long time without respiration; it can be suspended even for months, and yet the life of the animal be preserved. Toads can live for years enclosed in plaister of Paris* or other hard bodies: Belzoni, in excavating a ruin, found a Toad imbedded in a stone, and from the position of the stone, he believed the animal must have been there more than a thousand years. These singular phenomena would seem to indicate that the lungs are not the sole organs capable of producing a change in the circulating fluids of Reptiles. In Toads, Frogs, and Salamanders, the skin evidently at times performs this office, making a kind of external or cutaneous respiration, similar to that performed by the leaves of plants. The Salamanders breathe by lungs, and yet they may be kept alive in running water for more than a month; here the change of their circulating fluids must take place on the skin, and the same is probably true with respect to Reptiles confined for a long time in solid bodies, where the air cannot penetrate to the lungs. It seems probable, from the interesting experiments of Edwards,† that their existence is owing to the porosity of the substances in which they are enclosed, allowing air or moisture to be brought in contact with the surface of their bodies. The lungs are placed in the same common cavity with the digestive organs; as there is never a distinct septum or diaphragm between the thoracic and abdominal cavities. In the Chelonia, however, there is a muscle that may be useful in respiration;‡ I have found this well developed in the Emys serrata, consisting of two lateral portions descending from the vertebral column and inferior surface of the shell, and nearly surrounding the abdominal contents. The lungs differ in the various tribes, but are of large proportionate size in all Reptiles. In the Chelonia, they are situated above the other viscera, are very extensive, reaching almost to the pelvis, and are capable of containing a great quantity of air. In the Saurian animals, the lungs are similar to those of the Chelonia, but in general they do not extend so far back—forming two sacs, varying in size, and made up of polygonal cells. Serpents are remarkable in having a single lung; a small blind depression, first observed by Nitzsch,* must be regarded as the rudiment of another. The lung is here long and very dilatable, and is analogous to the air bladder of some Fishes; it is conical in shape, with its parietes vascular, having numerous small and short folds on the inner surface. The Batrachia form the connecting link between the Reptiles and Fishes, in their mode of respiration. In Frogs, the lungs are large, with distinct cells, filling up a great portion of the cavity of the abdomen when distended; in the Salamander, they are simple sacs, in the walls of which may be seen cells analogous to those observed in Serpents. The Sirens have branchial arches joined to the lingual bone, to which are attached gills, and extensive pulmonary air sacs, reaching almost to the posterior part of the abdomen.

---

* Carus, Vergleich. Zoot. Zweit. Theil., p. 514.

† Cuvier, Leçons d'Anat. Comp., tom. iv. p. 162.

---

* Herrissant enclosed three Toads in small boxes, and covered them with plaister; at the end of eighteen months two were found alive and active.

† De l'Influence des Agens Physiques, &c. Paris, 1824, p. 15.

‡ Meckel. Vergleich. Anat. Drit. Theil., p. 128.

The *trachea* presents considerable variety in its structure and mode of subdivision; in some, it is composed of complete cartilaginous rings; in others, the cartilages are incomplete. In the Testudo (Gopher) it is long, subdividing in the thoracico-abdominal cavity into primitive bronchia; in the Emys, the subdivision is still lower down, and the bronchial tubes remain for a short distance attached to each other. In the Sauria, the cartilaginous rings are complete, and the trachea only subdivides when it has reached the lungs. In the Serpents, where we meet with but one lung, of course no subdivision of the tubes can take place; the trachea commences by a longitudinal fissure, behind the sheath of the tongue, and the cartilages that enter into its formation are only complete rings at its upper portion; the inferior rings, surrounding only the anterior part. In the Batrachia, the bronchia are extremely short, as the lungs begin just below the larynx, which is also short, but of great breadth. Much variety is also observed in the modes of termination in the bronchial tubes; in the Chelonia they terminate by small lateral communications with the pulmonary cells, while in Serpents they end in large orifices.

Mechanism of Respiration.—This differs greatly in Reptiles from the Mammalia; there, it is effected by the agency of the diaphragm, the ribs, and intercostal muscles; here it is produced by an arrangement of the parts about the neck, and by the abdominal muscles. The lingual bone is drawn down by the muscles coming from the sternum; this enlarges the cavities of the mouth and fauces; air rushes in through the nares, which are afterwards closed; the lingual bone is then elevated, and the air is forced through the glottis and trachea to the lungs. The process therefore, consists of the deglutition or swallowing of air, instead of its inspiration, as in Mammalia; and this mechanism explains to us why the lungs do not collapse when the cavity of the chest is opened; and even should they be compressed, the animal has the power of inflating them again, as long as the parts about the mouth and larynx remain perfect. In the Sauria, respiration is aided by ribs, movable on the spine, and united in front to each other, or with a sternum of greater or less extent. In Serpents, as in the Sauria, respiration is assisted by ribs and abdominal muscles; but here the anterior extremity of the ribs is always free and unconnected, and their mode of attachment to the spine, by elastic ligaments, allows considerable dilatation, and they can be drawn together by means of the intercostal muscles. The ribs, in this class, besides aiding in respiration, are instruments of progression, the animal advancing them, when in motion, like the legs of caterpillars.* In the Batrachia, no ribs are employed in respiration; they are either entirely wanting, or are too short to have any effect.

---

* Nitzsch. Comment. de Respirat, &c., p. 13.

Physiology of Respiration.—The immediate effect of this function is to convert the venous into arterial blood, in order to fit it for nutrition. The colour of the blood is changed in the cells of the lungs; its temperature is elevated, and in the higher classes its tendency to coagulation is very much increased; and there is no doubt that a similar change takes place in the lungs of Reptiles; not so complete, however, because only a portion of the blood is offered to the lungs. The respiratory organs may be regarded also as the principal source of animal heat, the temperature being most elevated in those animals where respiration is most perfect. Where most blood is exposed to the air in the lungs, as in man, its temperature is 98° of Fahrenheit, and in some of the Birds it is even higher than this. Mammalia and Birds have the power of preserving this temperature during life; the heat of the body being maintained by respiration, gives them the ability of generating and preserving a uniform temperature under all circumstances, whether in hot or in cold climates. In Reptiles on the contrary, where but a moiety of the blood is carried to the lungs, and this only at irregular intervals, we find their temperature but little removed from that of the medium in which they live. Not having the power of generating the necessary degree of heat to preserve an equable temperature, it follows that cold renders the animal torpid, and even, if too intense, destroys it altogether. The temperature of land Tortoises and Frogs is about 40°, when that of the atmosphere is 35° of Fahrenheit. Hunter,* by freezing mixtures, reduced the temperature of the stomach of a Frog to 31°; below this, it could not be diminished without destroying the animal. From these observations, it results that external heat is more necessary to the existence of Reptiles than of all other vertebrated animals; heat increasing their activity, their sensibility, growth, and developement, the largest species being always found in the tropical regions. Cold abstracts their caloric, benumbs their faculties, renders them torpid and inactive; and as winter approaches, they seek a shelter—some, as the Gopher, in holes excavated by itself in the earth, others under the bark of trees, or in the crevices of rocks; many retire to the reedy banks or muddy beds of rivers, and as the degree of cold increases, they fall into a deep sleep, "the twin sister of death," which neither noise nor even wounds can interrupt. At this time the functions of organic life alone are active: the circulation is languid, the respiration suspended—at least pulmonary respiration—for many of them hybernate in mud, covered with water, and in other situations where no atmospheric air can penetrate the lungs. Buried in this profound sleep, they remain until the returning heat of spring restores them to life and activity. In Carolina, where the winters are seldom severe, the hybernation is never complete; a few warm days in the winter restore them to life; I have often met the Rana gryllus and various Water-snakes, in January, and have seen the Scaphiopus, attended by its mate, in very warm weather at Christmas. During hybernation, Reptiles can undergo an intense degree of cold; we have seen Frogs frozen in a solid lump of ice, which being melted, the animals regained their activity; and Du Fay observed the same thing of Water-newts.* Other animals of a higher grade hybernate in the colder parts of our country, as the Wood-chuck, (Arctomys monax,) and many kinds of Bat, (Vespertilio,) but in none is the sleep so profound, the suspension of the faculties so complete; the pulmonary respiration continues, though diminished in frequency, yet enough to support the life of the animal. It follows from these remarks, that Reptiles belong essentially to warm, or at least to temperate, climates; none are found in the extreme cold regions either of the north or south; there they could not retain the necessary degree of activity to seek their food or reproduce their species. Reptiles can withstand the operation of great heat, as well as of intense cold; they thrive under our hottest summer suns, and are found even in some springs of a greatly elevated temperature.

---

* Home's Lect. Comp. Anat., vol. i. p. 115.

---

* Observations on the Animal Economy, p. 104.

Connected with the mode of life and the nutritive functions of Reptiles, is the remarkable phenomenon of the restoration of parts when injured, or the complete reproduction of organs which have been destroyed. This reproductive power is very active in the inferior order of animals, and the lower we descend in the scale the more remarkable are its manifestations. In Crabs and Lobsters, limbs are readily restored, and in snails, the entire head has been reproduced; the head of a Hydra may be split in several places, and each subdivision will become a new head. In the higher classes, wounds may be healed, injuries repaired, but an organ once destroyed, cannot be reproduced; and even in Reptiles of a higher degree of life, as in the Chelonia, reproduction of parts is never complete as in those of a lower grade of organization, as in the Salamander. Pliny first observed that some Reptiles reproduced the tail; and Bonnet† and Blumenbach‡ have confirmed this remark, and made many curious experiments on the reproductive power of Reptiles. They removed the limbs of a Waternewt, and in less than one year they were perfectly restored; the newly formed extremities were amputated in their turn, and in turn were replaced by others; even the eye of a Salamander was extirpated in one of these experiments, and in less than eighteen months this delicate organ, with its complicated apparatus of humours and transparent media, was perfectly reproduced. Dumeril* has made other experiments of the same nature, with still more remarkable results; a Triton lived three months with three-fourths of its head removed, and consequently deprived of its principal senses, sight, hearing, &c., yet it had apparently a consciousness of its existence, and moved cautiously from place to place; at the end of that time nature had made considerable efforts at *restoration*. This wonderful degree of reproductive power in the inferior Reptiles, as in the Salamander, &c., may be perhaps explained by the low grade of their organization, which approximates them slightly to the Polypi and some of the Medusæ.

---

* Mem. de l'Acad. des Sciences, 1729, p. 144.

† Œuvres d'Histoire Naturelle, tom. v.

‡ Specim. Phys., p. 31.

Organs of Voice.—This is the first class of animals in which we meet with a voice, properly speaking, or one connected with the respiratory organs. Many animals can indeed produce a variety of sounds; some by friction of their wings; others, as gnats and flies, by rubbing the roots of the wings in their articular cavities.†

The *larynx* is simple in its structure, having no epiglottis, and in some no vocal chords; in the latter case, there can be no voice. In all, the voice must be guttural, as they have neither soft palate‡ nor movable lips to modulate it; most frequently it is produced with the mouth closed, the outlet of the sound being the nostrils. In the Chelonia§ and Ophidia there is no voice, but merely a hissing sound, occasioned by the rushing of the air through the glottis. Some of the Sauria, as the Alligator, can produce a very loud noise; in this animal the ligaments of the glottis are free and strong, the larynx extending above them on the outer side, like a sac. The voice is most perfect in Frogs and Hylæ; in these the vocal chords are large, prominent, and free; the larynx is short and wide, without an epiglottis, though the posterior extremity of the valve-like tongue is supposed by some Naturalists to perform the office of one.* In the male Frogs, we find sacs on each side of the lower jaw, under the ear; in the Hylæ, there is a single sac under the throat; these are distended with air when the animal croaks. In these animals, as in some Birds, the voice is only heard at one season of the year; and in the Frogs it is generally, though not invariably, guttural and unpleasant; but some of the Hylæ or Tree-frogs have a clear metallic sound, not wholly without sweetness.

---

* Histoire Naturelle des Reptiles, tom. v. p. 209.

† Oken, Zool. § 466. But we cannot suppose with him that the wings are analogous to "dried up" gills, and in this way refer the sounds produced by insects to the respiratory organs.

‡ The soft palate of the Alligator does not seem arranged to modulate sound.

§ Dumeril, Hist. Nat. des Rept., tom. ii. p. 514, says the Coriaceous Turtle (Sphargis coriacea) emits a plaintive sound when taken.

Nervous System.—All the organs hitherto described, as well as the functions they perform, concur to produce one great end, the maintenance of organic life; the apparatus for this effect is perfect, and most of its operations are carried on without the knowledge or consent of the animal. Nature has not submitted operations of such vital importance as respiration, digestion, circulation, &c., to the influence of any causes that depend on the mental or bodily state of the animal, which is liable to frequent change; these phenomena are effected secretly and unconsciously, but constantly. The parts subservient to vegetative life form the basis on which is erected a system of more noble organs, those that elevate the animal above plants, or one animal above another, those organs on which depend sensation, perception, and voluntary motion.

The whole nervous system may be divided into a central and a peripheral portion; the spinal marrow and the brain making the central part, the nerves of the body constituting the other portion.

---

* Rudolphi, Grundriss der Physiologie, Zweit. Band, 375, thinks the epiglottis only useful in directing the current of air from the extensive nasal cavities to the glottis, in higher animals; these being wanting in Reptiles, there is consequently no occasion for an epiglottis, and none exists.

The *spino-cerebral axis*, or central part of the system, is only found in the vertebrated animals, and is the seat of all sensation, the centre of organic as well as of animal life; as it exercises an influence through the sympathetic nerve over the organs of vegetative life, as respiration, circulation, secretion, &c. The spinal marrow is placed in the canal of the vertebral column, and the brain is the portion situated within the cavity of the cranium.

The *spinal marrow* is a cylindrical chord, with a deep furrow on the anterior surface, and a more superficial one on the posterior; it is composed of two substances, belonging to the nervous system in general; a gray or pulpy, and a white or fibrous substance, made up of minute filaments. Its extent varies in the different Reptiles—long in the Sauria, Serpents and Salamanders, extending as far as the caudal vertebræ; in Frogs and Toads, it is short and thick, and ends at the sacrum.*

The *brain*, or nervous mass contained within the cranium, may be regarded as the anterior extremity of the spinal marrow, enlarged in size by an increased developement of nervous matter. In all Reptiles it is remarkably small, not filling up even the small cavity of the cranium; its size is diminished not only when compared to that of the Mammalia and Birds, but in proportion to the spinal marrow, which preponderates greatly in volume; it differs also from the brain of the higher classes in the form, size, and relative position of its various parts, and in the entire absence of convolutions. Cuvier† observes that "the brain of Reptiles may be distinguished from that of all other animals by the position of the optic beds behind the hemispheres." It wants, moreover, a corpus callosum, a fornix with its appendages, and a pons varolii; all the parts of the brain too, are placed one behind the other, instead of being situated one above the other. This different disposition of the different parts depends no doubt on their degree of developement; for were the hemispheres larger, they would necessarily cover the optic beds.

---

* Sérres, Anat. Comp. du Cerveau, tom. ii. p. 117, observes the spinal marrow exists in the tail of the Tadpole, but disappears when the animal undergoes its metamorphosis.

† Leçons d'Anat. Comp., tom. ii. p. 174.

The *nervous substance* within the cranium is subdivided into three different portions—the medulla oblongata, the cerebellum, and cerebrum. The medulla oblongata varies very much in different genera; it is prominent in Serpents, and flat in the Salamanders; and in all Reptiles, the pyramids, and the restiform as well as olivary bodies, are small; the latter decrease in size from the Tortoise to the Siren. The cerebellum is small, slightly developed, and simple in structure; it is largest in the Chelonia and Sauria, and hemispherical in form, and in all wants that disposition of the white and gray substances producing the arbor vitæ; its colour varies a good deal—ash-coloured in Serpents, reddish-gray in the Batrachia and Sauria, and deeper red in some of the Chelonia. The hemispheres of the brain are always less developed than in the Mammalia or in Birds, and hence the lesser degree of intelligence in these animals; the degree of intellect invariably corresponding with the degree of developement of the anterior lobes of the brain. In the Chelonia the hemispheres are large, oval in shape, and have a ventricle or cavity within. In the Sauria the hemispheres are still larger in proportion to the other parts; while in the Serpents they are short, very hard, and terminate in a club-like olfactory nerve.* "In the Batrachia the hemispheres are elongated and narrow, and in some genera, as in the Salamander, they are almost cylindrical in shape; and in all Reptiles, when the hemispheres are separated, a small pineal gland may be seen resting on the optic beds."†

Nerves, are the instruments by means of which the relations of the animal are carried on with the external world, for any impression made on the peripheral extremity of a nerve is transmitted with incalculable velocity to the nervous centre, there to produce its sensation of pain or pleasure. No sensation can be felt if the free communication of a nerve with the spinal marrow and brain, be interrupted by accident or design. The destruction of a nerve supplying a part is followed by insensibility, if the nerve be one of sensation, and loss of locomotive power, if the nerve be one of motion; for the nerves of the body have very different offices to perform, according to their connexion with the nervous centre;*—their functions are all determinate and cannot be changed, for one nerve cannot perform the office of another. The extremity of a nerve that touches the central mass is called its origin; the peripheral end, or that spent on the various organs of the body, its termination; and physiologists are still in doubt as to the ultimate disposition of the peripheral extremity of the nerves. All nerves are protected at their peripheral extremity, for in no instance does the body producing the impression come in immediate contact with the extremity of the nerve; and we often find peculiar structures frequently very complicated, to facilitate certain impressions; thus, the optic nerve ends on the retina, which is beautifully arranged to receive impressions from light; the auditory is spent on the internal ear, disposed to be impressed by sonorous undulations; even the nerves of touch are covered by the cuticle, through which the impression is made, and if this be removed, the sensation of touch is weakened or entirely destroyed.

---

* Carus, Vergleich. Zoot. Erst. Theil., p. 508.

† Sérres, Anat. Comp. du Cerveau, tom. ii. p. 485; also Tiedemann, Anat. Comp., par Jourdan, p. 242.

Vision.—All Reptiles have organs of vision, and in many the eyes are prominent and large; in some, however, as in the Siren and Amphiuma, they are exceedingly minute, almost in a rudimental state; in all, they are movable and placed in imperfect bony orbits. There is a manifest decrease in the developement and degree of perfection of many parts of the organ when compared with the eye of more elevated animals. The eye of the Reptile is intermediate in its structure between that of Birds and Fishes. Blainville† thinks that it has most relation with that of Birds, while Carus‡ is of opinion that it approximates to that of Fishes, in its external covering, size of the lens, imperfect developement of the ciliary processes, and limited mobility of the iris.

---

* Charles Bell, Phil. Trans. for 1822. The spinal marrow consists of four chords, two anterior and two posterior; if a nerve be connected with both, or has a double root, it is then a nerve of sensation and motion; if it be connected with only one of these chords, it is then a nerve of sensation or motion, but cannot perform both functions; if it is connected with the superior and lateral portions of the spinal marrow or medulla oblongata, then it becomes a respiratory, vocal, or nerve of expression.

† Princip. d'Anat. Comp., tom. i. p. 411.

‡ Vergleich. Zoot. Erst. Theil., p. 394.

The ball of the eye is generally spherical in shape, and as in the Mammalia, consists of several different structures: there are external membranous coverings for retaining all its parts in their proper relative position, vascular portions to nourish the whole, transparent media to refract the rays of light and concentrate them to one point, and a pulpy substance on which they fall and form an image of the object from which they are reflected. Many other parts are always found subservient to the globe of the eye; glands for secreting the tears, to wash its anterior surface; canals through which the tears afterwards pass to the nasal cavities, or to the mouth; together with several curious muscles to move the eye in various directions.

In the Chelonian Reptiles the eye is most perfect, though it even varies here according to the habits of the animal. The sclerotic coat is thin, but hard and resistant, its anterior part being strengthened by bony scales which surround and support the oval cornea; the choroid is thick, with its ciliary processes but slightly developed: the retina too, is thick, and spread out around the entrance of the optic nerve. The crystalline lens, convex in all the Chelonia, is most so in those species that are aquatic in their habits, and is more convex on the anterior than on the posterior surface.* The iris varies exceedingly in Reptiles, not only in colour, but in the extent and rapidity of its motions; these are most remarkable in the Green Turtle, when exposed to a strong light. The eyelids in some of the Chelonia are thick and covered with scaly plates; they are smooth in many others; the inferior lid, in all, is the larger and more movable. There is a third eyelid or membrana nictitans extended from the internal canthus over the ball of the eye, as in Birds, but less developed, less complete, and less movable. In the Sauria, the form of the eye and general disposition of its individual parts, are very nearly similar to those of the Chelonia; but the sclerotica is thinner, and in many, wants the bony scales surrounding the cornea, which is here still more convex; the choroid coat is thinner, but covered with an abundant pigment; and the ciliary processes, only slightly developed in the Chelonia, are very evident and distinct in this class of animals. In Serpents the ball of the eye is nearly spherical, the sclerotica is unsupported by scales, and the crystalline lens more convex than in the Saurian Reptiles. The eye appears at first to be fixed, and without lids, or any lachrymal apparatus; Cloquet* has, however, demonstrated the existence of both these appendages to the eye of the Serpent; the lids pass over the globe of the eye, and although extremely thin and transparent, are composed of three layers, the outer of which is continuous with the external organs of integumation, and falls off with the cuticle when the animal sheds its skin. The lachrymal canals are minute tubes, beginning between the transparent integuments and the cornea at the inner canthus, and opening into the nasal cavities in venomous Snakes, and into the cavity of the mouth in those that are innocuous. The Batrachia approach the Fishes in their organ of vision: in the Frog, the eye is large and prominent, but can be drawn at will into the cavity of the mouth; the globe is spherical, the sclerotica hard, but without scales in front; the cornea is convex and prominent, the choroid dark on the posterior surface, and the ciliary processes are but partially developed; a small tubercular mass that occupies nearly their relative position has been regarded by Altena† as a modification of their structure. The iris varies a good deal in the Batrachia; but the tints are beautiful in all the Frogs and Toads. The lens is large in this tribe of Reptiles, and spherical in form, or very nearly so. Frogs have but two eyelids; the part described by some Naturalists‡ as a membrana nictitans is evidently the inferior lid, which is thin and movable, and when depressed makes a fold, which fold has been considered as the lower eyelid itself. To cover the anterior part of the ball of the eye, this fold must necessarily ascend perpendicularly; whereas a third eyelid, wherever it exists, moves horizontally from the internal towards the external angle of the eye.* The arrangement of the eyelid is the same in the Toads as in the Frogs and Hylæ, the upper lid being larger and warty, the lower smaller and less movable. In the Salamander, the structure of the eye is nearly the same as in the Frogs; but the lens has a hard central portion, as in Fishes.

---

* Albers. Denkschrift der Münch. Akad., 1808, § 84.

---

* Mem. du Muséum, tom. vii. p. 65.

† Quoted by T. Bell, Esq., in an excellent article on the Amphibia in the Cyclopedia of Anatomy and Physiology, Part I. p. 101.

‡ Cuvier, Leçons d'Anat. Comp., tom. ii. p. 433.

The *optic nerves* come from different sides of the brain, decussate or cross each other; and at the place of crossing in some, as in the Chelonia and Sauria, there is a communication of the substance of the two nerves; while in others, as in the Serpents and Batrachia, there is only a simple crossing of the nerves from the right to the left side, without their contracting any union or any intermixture of their substance. The optic nerves perforate directly the sclerotica, and form a small rounded prominence, around which is extended the retina, which we do not regard as an expansion of the optic nerve, but rather as a membrane of peculiar structure on which the nerve terminates. Such being the structure of the eye in Reptiles, it follows that vision is much less perfect in this class of animals than in the Mammalia or Birds, nor is the organ of equal power in all the Reptile tribes. The Emydes have the most acute sight; many of them, as the E. serrata and the E. picta are extremely shy, and retreat suddenly when approached. Many others, as various Serpents, have the eye extremely brilliant and sparkling, yet it is not the brightness of eye accompanying intelligence, as observed in the higher classes, but the glare of animal instinct and passion.

HEARING.—An organ of hearing exists in all Reptiles, though much less complete than in the Mammalia and Birds; many parts essential to the perfection of the organ are wholly wanting, or at most, only slightly developed. We observe a more manifest decrease in the degree of perfection in the ear than in the eye, when compared with the higher classes of animals.

The structure and arrangement of its parts vary still more in the different tribes than do those of the eye; the Chelonian and Saurian Reptiles, in some respects, approaching the Birds, while in the Sirens we perceive a similarity of structure to the Fishes. We find no external ear destined to collect and concentrate sound and direct it to an internal organ; even the membrane of the tympanum is not apparent in all the species; it is concealed in the Chelonia, Serpents, Engystoma, &c. by the organs of integumation passing over it, apparently unchanged in their nature. In Frogs and Hylæ it is large, smooth, and very apparent; less so in the Toads, and in the Salamander wanting altogether. The cavity of the tympanum is the space between the membrane of the same name, and the labyrinth or internal ear, varying in size and arrangement, and containing the small bones of the organ. This cavity communicates in all the tribes, where it exists with the fauces, by a canal called the Eustachian tube. This tube and canal form a sort of primitive organ of hearing, for in the lower classes it seems to transmit sound to the internal ear;* but as we approach the higher orders, where the membrane of the tympanum becomes more perfect, and the external ear more developed, this canal decreases in size and seems designed for the transmission of air only, to the cavity of the tympanum. In the Chelonian Reptiles, the cavity of the tympanum contains a single bone called columella, having a long stalk and an oval flat portion, attached by the small end to the tympanal membrane, and joined by its oval extremity to the labyrinth; this is admirably well arranged to transmit impressions, made on the drum of the ear without, to the labyrinth within, where the auditory nerve is spent. Some Anatomists† have considered the columella composed of three portions, an external cartilaginous, a middle bony, and an internal one, again cartilaginous in structure. In the Sauria we find nearly the same arrangement, the cavity of the tympanum being only a little more capacious. In Serpents, this cavity is extremely small, and the bone of the ear instead of going to a tympanal membrane, is attached by its outer extremity to the parts about the articulation of the lower jaw. In Frogs, Hylæ, &c. this cavity is large, and contains two bones analogous to the incus and malleus:* there is a similar arrangement in Toads, though the chain of bones is longer, and both are well disposed to carry impressions to the labyrinth. The membrane and cavity of the tympanum do not exist at all in the Salamanders; nor have they an Eustachian tube opening into the fauces. The labyrinth or internal ear consists of three semicircular canals, and a sac containing a substance resembling starch in appearance; in some there is a rudiment of a cochlea, as in the Chelonia, which is still more distinct in some of the Saurian Reptiles; in those consequently the organ of hearing must be more delicate than where the cochlea is wanting. In the Salamander, another and very different arrangement of parts is observed; the labyrinth is completely closed, having no external communication whatever. From this structure it results, that the sense of hearing must be much less perfect in Reptiles than in the Mammalia and Birds; they cannot distinguish delicate sounds, nor can they be made like the Birds to imitate them.

---

* Carus, Vergleich. Zoot. Erst. Theil., p. 395.

---

* Scarpa. Disq. de audit. et olfac., p. 27.

† Blainville, Princip. d'Anat. Comp., tom. i. p. 541.

Smell.—The organ of smell is less developed in Reptiles than in the Mammalia and Birds; nor is it apparently employed in selecting food, as in those classes, or even as in the Fishes, where the olfactory organ is intimately connected with the functions of nutrition and respiration. The nasal cavities are extremely simple in their arrangement, and of very limited extent, lined with a pituitary membrane, sometimes folded, on which the olfactory nerve is distributed.

The external nares are small, and placed near the snout; in some they are close together, in others, farther apart; in most, the orifices can be contracted, dilated, or completely closed in respiration. The posterior nares open but a short distance behind the anterior; in the Chelonia they are situated about the middle of the palate, and still further back in the Alligator. In Serpents, the canals are broader, but much shorter, and in such as have dilatable jaws, the two external nares seem to form only one posterior opening, which enters near the mesial line.*

---

* Pohl. Exposit. Organ. Audit., p. 12, as quoted by Gore in his excellent translation of Carus's Comparative Anatomy says, there is but a single bone similar to the columella of the Chelonia in the tympanal cavity of Frogs. Blainville, on the contrary, describes three of these bones. Loc. cit., p. 539.

The sense of smell is least perfect in the Batrachian animals; the anterior and posterior nares being almost opposite each other, the latter opening just within the border of the upper jaw; consequently the canals can be of but small extent. The olfactory nerve detached from the olfactory lobe of the brain, does not subdivide, as in the Mammalia, and pass through an ethmoid bone, but enters a single nerve without ramification until it arrives at the pituitary membrane, where it divides into large fibres and then terminates. As there are no extensive sinuses and cells to arrest the odoriferous particles contained in the air, while it passes to the lungs in respiration, it follows that the sense of smell must be less perfect—nor is it in as constant operation as in the Mammalia, where it is placed as a guard to determine the nature of the air respired.

Taste.—All Reptiles have a tongue, varying however greatly, as we have seen, in its shape, organization, and mode of attachment, but certainly having little claim to be considered as an organ of taste; since it is not constituted to receive delicate impressions, being often covered with a thick, and in some instances, with a horny cuticle. Swallowing their prey rapidly, and without mastication, a delicate sense of taste would be here useless in determining the nature of their food, and it is probable that the sense is entirely wanting or at best but feebly developed, in Reptiles.

Organ of Touch.—There is a general sensibility no doubt in the whole surface of the bodies of Reptiles, by means of which the animals may be made acquainted with the presence of external objects; but this sense is not perfect enough to enable them to distinguish the form or other properties of bodies that are made known to the higher animals by a sense of touch. In the inferior animals this sense is intimately connected with the nutritive organs, and is only sufficient to afford information as to the nature and qualities of the food; hence these organs are placed near the mouth, as the feelers in crustaceous animals, and the barbels or tentacula in many Fish.

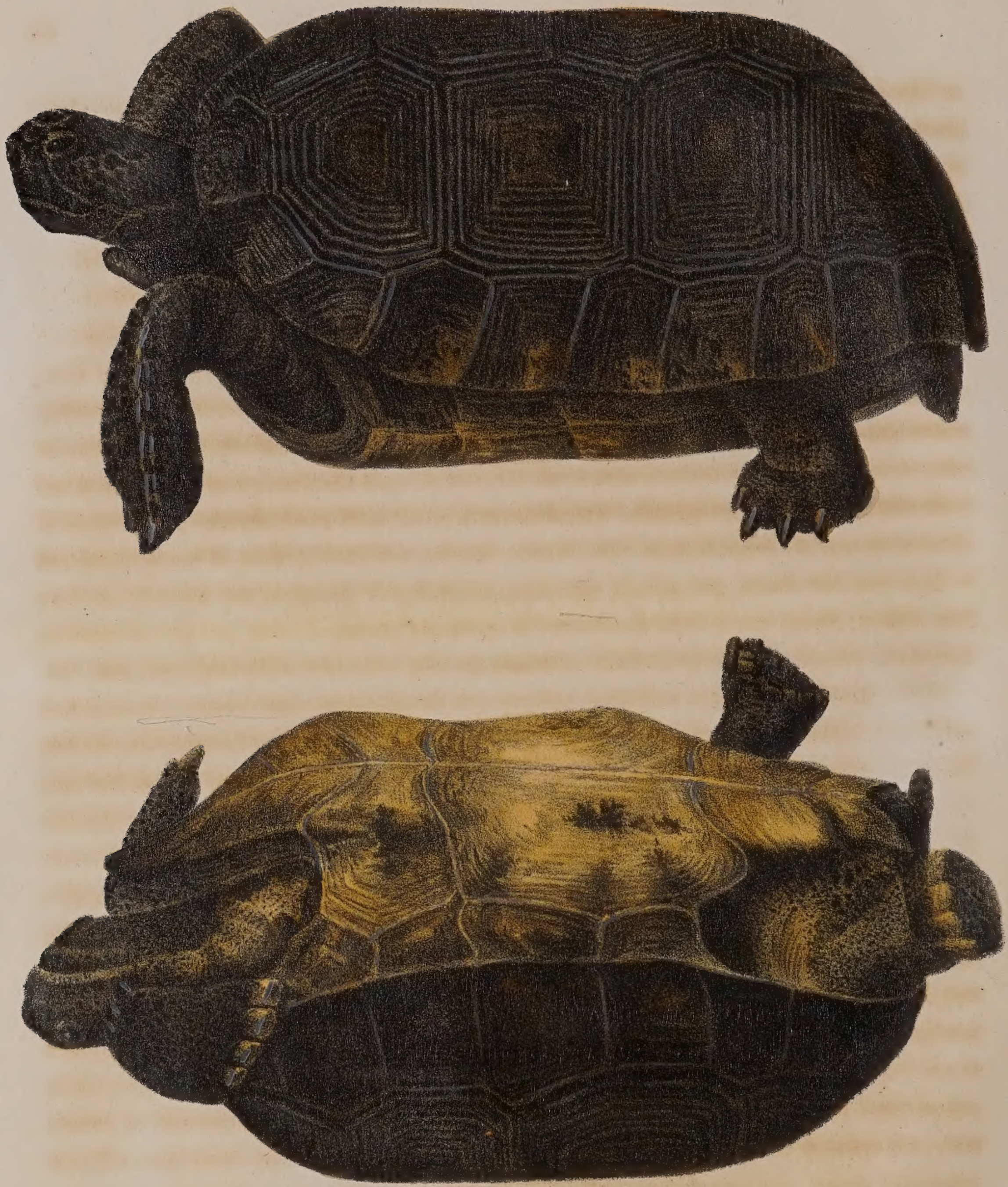
---

* Dumeril, Hist. Nat. des Rept., tom. i. p. 37.

In Reptiles, the snout of the Frog is said to be used as an organ of touch; and it is possible that the long slender bifid tongue of Serpents may be employed in examining the nature of external objects, for we observe them constantly protruding it when moving cautiously from place to place; but we cannot suppose with Blumenbach and Roget,* that they have an accurate sense of touch, from their being able to entwine themselves round objects; for the thick scales with which their bodies are covered, prevent them enjoying this sense in a higher degree than other Reptiles. In no animal of this class do we ever find, as in the Mammalia, an organ developed like the extremities for grasping and holding bodies, and a peculiar arrangement of parts for determining their character.

---

* Roget, An. and Veg. Phys., vol. ii. p. 290.



Testudo polyphemus

1.

Sera pinx^t

On Stone by G Lehman

Lehman & Duval Lith^rs

TESTUDO.—*Brongniart.*

Genus Testudo.—Characters. Body protected by a horny covering; shell (carapace) solid; sternum (plastron) solid and immovable; jaws without teeth; extremities short, thick, and clavate; toes short, closely joined, and covered by the integuments as far as the nails; anterior extremities with five, posterior with four, short strong conical nails; head and extremities retractile within the shell.*

TESTUDO POLYPHEMUS.—*Daudin.*

Plate I.

Characters. Shell irregularly oval, flattened above, ecarinate, entire; supracaudal plate single and incurvated below; sternum elongated, projecting beyond the shell in front, and deeply emarginate behind; colour of the shell brownish-yellow, clouded with darker brown; sternum yellow.

Synonymes. Gopher, *Bartram*, Travels in the Floridas, Carolinas, &c., p. 182.
Testudo Polyphemus, *Daudin*, Hist. Nat. des Rept., tom. ii. p. 256.
La Tortue Gopher, *Bosc*, Nouv. Dict. d'Hist. Nat., tom. xxii. p. 269.
T. Polyphemus, *Say*, Jour. Acad. Nat. Scien., vol. iv. p. 207.
T. Carolina, *Leconte*, Lyc. Nat. Hist. N. Y., vol. iii. p. 79.
T. Polyphemus, *Harlan*, Jour. Acad. Nat. Scien., vol. vi. p. 21.
T. depressa, *Cuvier*, Reg. Anim., tom. ii. p. 10.
T. Polyphemus, *Gray*, Synop. Rept., p. 11.
Gopher and Mungöfa, *Vulgo.*

---

* It is my intention at this time to give only the characters of the different genera; in a subsequent number I shall add the special anatomy of each genus, illustrated by drawings.

Description. The shell is remarkably depressed, nearly flat above, with its margin entire, slightly revolute in front, and incurvated posteriorly. The vertebral plates are five in number; the anterior is pentagonal, presenting an obtuse angle forward; the remaining four are hexagonal, the posterior irregularly so. The first lateral plate is irregularly triangular, with its basis rounded and joined to four marginal plates; the second and third are pentagonal, with an acute angle above, passing in between the vertebral plates; the posterior is irregularly quadrilateral, the longest border directed downwards. The marginal plates are twenty-four in number; the intermediate is irregularly quadrilateral, and largest behind, where it joins the first vertebral plate; the supra-caudal is single, very large, having twice the extent in the horizontal that it has in the vertical direction, its lower border is incurvated, which gives this plate a remarkably bulging appearance. The first marginal plate is pentagonal, the second square, the third irregularly quadrilateral, and the fourth pentagonal; the four succeeding plates are quadrilateral, and of greater elevation than breadth, slanting a little backwards; the ninth, tenth, and eleventh marginal plates are irregularly quadrilateral; the tenth having its posterior and superior angle truncated, where it joins the posterior vertebral plate. All these plates are marked with concentric striæ, which are most remarkable on the lateral and marginal, and are often wanting on the vertebral plates; in many old individuals these disappear entirely, and leave the shell perfectly smooth.

The sternum is thick and firm, prolonged beyond the shell in front, and deeply emarginate behind. The gular plates are quadrilateral, and unite to form a spade-like process, with its anterior extremity generally entire, but occasionally emarginate; the brachial plates are quadrilateral, with their outer and anterior angles rounded, the anterior border shortest and oblique in direction to receive the gular plates; the thoracic plates are very irregularly pentagonal, narrow, and of great extent in the transverse direction; the abdominal are quadrilateral and very large; the femoral are also irregularly quadrilateral, with the longest border directed forwards; the subcaudal plates represent oblong squares, and are most extensive in the transverse direction. Of the supplemental plates, the axillary are oblong, and the inguinal, semicircular in shape.

The head is short, thick, obtuse, and covered with small plates on the superior parts, and with larger plates in front, which are disposed in rows; one between the anterior parts of the orbit, consisting of two very large central plates and two external, smaller; in front of this is a second row of six smaller plates, and still anterior to this row are others of smaller size. The nostrils are small and near together. The eyes are large and open; the iris dark; the pupil almost black; the lower lid more extensive than the upper, and both covered with small plates. The jaws are covered with horny plates, grooved, and having their margins serrated: the grooves allow the jaws to be received reciprocally within each other when the mouth is closed. The neck is short, and the skin granulated.

The anterior extremities are very large, thick, compressed in the antero-posterior direction, and terminating in five fingers, each furnished with a thick and strong nail; along the outer margin of the forearm is a row of projecting horny points, resembling nails, large below, and decreasing gradually in size to the humerus. Another remarkably large horny tubercle exists near the internal and anterior part of the elbow. The anterior surface of the forearm and carpus is covered with large plates; the posterior surface of the carpus and lower portion of the forearm, with smaller plates; in other parts, the forearm and arm are granulated.

The posterior extremities are rounded, less compressed, short, thick and clavate, ending in four toes, each furnished with a strong nail. The sole of the foot, the lower and posterior part of the leg, and the posterior part of the thighs, are protected by large plates; two remarkably horny points are placed at the posterior and superior part of the thigh; the other parts of the posterior extremities are granulated, and covered with smaller plates.

Colours. The general colour of the shell is brownish-yellow, clouded at times with a darker brown, which latter colour predominates in some individuals;* the sternum is dirty yellow; the head is darker than the shell, sometimes almost black; the upper jaw is brown, the lower jaw yellowish; the neck and anterior extremities are dusky above, dirty yellow below; the posterior extremities simply dusky in colour.

---

* This colour was remarkable in the specimen from which the accompanying drawing was taken.

Dimensions. Length of shell, 14¾ inches; sternum, 12¼ inches; thigh, 2½ inches; leg, to the centre of the sole of the foot, 2¾ inches.

Geographical Distribution. The most northern limit of the Gopher is the western border of South Carolina; they are numerous in Edgefield and Barnwell districts, whence they extend through Georgia, Alabama, and the Floridas. According to Le Sueur they are brought to the New Orleans market, though probably not from the immediate neighbourhood.

Habits. They select dry and sandy places, are generally found in troops, and are very abundant in pine barren countries. They are gentle in their habits, living entirely on vegetable substances; they are fond of the sweet potato, (Convolvulus Batatas,) and at times do much injury to gardens, by destroying melons, as well as bulbous roots, &c. &c. In the wild state they are represented as nocturnal animals, or as seeking their food by night; when domesticated, and I have kept many of them for years, they may be seen grazing at all hours of the day. When first placed in confinement they chose the lowest part of the garden, where they could most easily burrow; this spot being once overflowed by salt water in a high spring tide, they migrated to the upper part, nearly eighty yards distant, and prepared anew their habitations. They seldom wandered far from their holes, and generally spent part of the day in their burrows. They delighted in the sun in mild weather, but could not support the intense heat of our summer noons; at those hours they retreated to their holes, or sought shelter from the scorching rays of the sun under the shade of broad-leaved plants: a tanyer, (Arum esculentum,) that grew near their holes, was a favourite haunt. They could not endure rain, and retreated hastily to their burrows or to other shelter at the coming on of a shower. As winter approached they confined themselves to the immediate neighbourhood of their holes, and basked in the sunshine; as the cold increased, they retired to their burrows, where they became torpid; a few warm days, however, even in winter, would again restore them to life and activity. The adults are remarkably strong, sustaining and moving with a weight of two hundred pounds or more. The female is generally larger than the male, with the sternum convex; the sternum of the male is concave, especially on its posterior part. The eggs are larger than those of a pigeon, round, with a hard calcareous shell; they are much esteemed as an article of food.

General Remarks. This is the only species of Testudo hitherto observed in the United States, and was first described by Bartram, under the name of Gopher; Daudin subsequently called it Testudo polyphemus, which name has since been generally adopted by Naturalists. Leconte has endeavoured to prove this animal to be the Testudo Carolina of Linnæus, which is considered by most authors as the Box Tortoise. From the very short description of the Testudo Carolina contained in the twelfth and last edition of the Systema Naturæ, by Linnæus himself, it is not so easy at first sight to determine the point; but if we consult the earlier editions, and compare the descriptions with the plates to which he refers, his meaning becomes evident. In the tenth edition he says, "Testudo pedibus digitatis, testa gibba, cauda nulla;" and the only reference given is to the figure of the Testudo tessellata minor caroliniana of Edwards,* which is certainly the Box Tortoise; for he says, "the lower shell is divided across the middle of the belly, and joined to the upper shell on the sides by a tough flexible skin, by means of which it can, when it draws in its head and legs, close or shut up its shell, as firmly as that of an oyster." Indeed, the figure given by Edwards is so correct and so well coloured, that Shaw afterwards copied it into his General Zoology, observing "that there is no particular necessity for any other description than that given by Edwards himself."† Here then, we have the name Carolina from Edwards, and the "*cauda nulla*" either from his description, "tail in a rudimental state," or from his plate, where the animal is represented without one.

---

* Edwards, Av. p. 205.

† Shaw, Gen. Zool., vol. iii., Part I., plate 7.

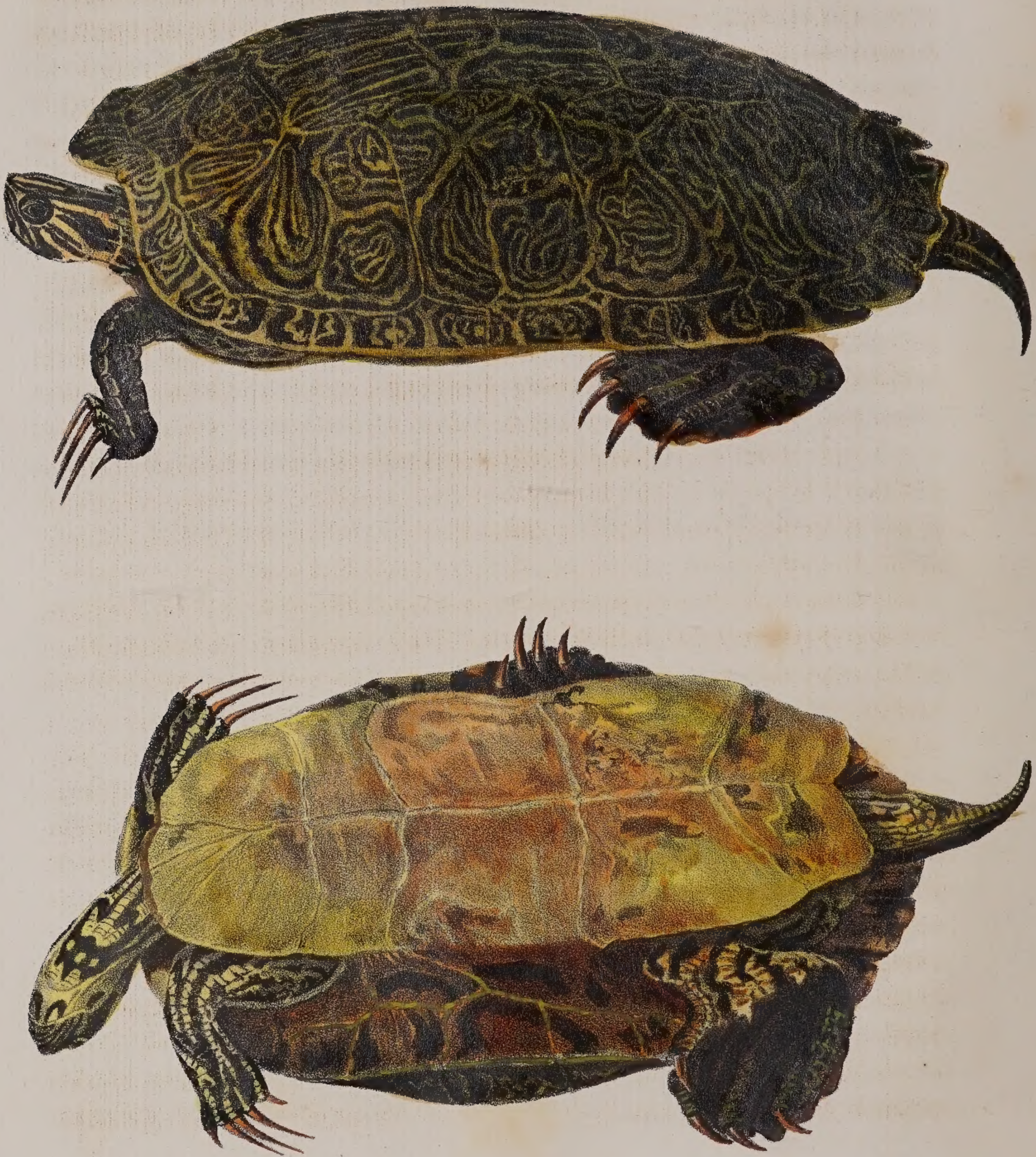
In the twelfth edition, Linnæus quotes in addition Gronovius,[*] "Testudo pedibus digitatis," &c., which description agrees better with the Box Tortoise than with the Gopher; and it is not improbable that Gronovius received it from Clayton, of Virginia, with whom he was in constant correspondence. Why Linnæus should have given an additional reference to Seba,[†] at the same time retaining the reference to Edwards, is not known, especially as Seba's plate bears no resemblance to that of the former, being a larger animal and drawn with a tail.

Gmelin, in his edition of the Systema Naturæ, besides retaining the description and reference of Linnæus, adds a longer description of his own; and here perhaps, Leconte is right, in supposing that he may have had our animal in view, as the description corresponds more nearly, and cannot be applied to the Box Tortoise. Still however, the name Carolina cannot be retained, as it had been previously applied by Linnæus to another species.

---

[*] Gron. Zooph. 17. n. 17.

[†] Seba, mus. i. t. 80. f. 1.



Emys hieroglyphica

2

Sera pinxt On Stone by G. Lehman. Lehman & Duval Lith^{rs} Philad^{a}

EMYS.—*Brongniart, Dumeril.*

Genus Emys.—Characters. Shell depressed, solid; sternum broad, solid, immovable, firmly joined to the shell, consisting of twelve plates, and four supplemental ones; extremities palmated, anterior with five nails, posterior with four; head of ordinary size; tail long.

EMYS HIEROGLYPHICA.

Plate II.

Characters. Shell oval, depressed, ecarinate, smooth, entire in front, elongated and imperfectly serrated behind; sternum oblong, emarginate posteriorly, dingy yellow; head very small; upper jaw slightly emarginate, lower jaw furnished with a tooth.

Description. The shell is oblong-oval, very flat, smooth, ecarinate, entire in front, and imperfectly serrated behind. The first vertebral plate is urceolate; the second and third are hexagonal, the former with its anterior, the latter with its posterior margin, concave; the fourth vertebral plate is very irregularly hexagonal, with the lateral angles produced; the fifth heptagonal. The first lateral plate is irregularly triangular, with the basis rounded, and joined to four marginal plates; the second and third are hexagonal, with an acute angle above, received between the vertebral plates; the fourth is pentagonal. The marginal plates are twenty-five in number; the nuchal or intermediate plate is nearly a parallelogram; the first marginal plate is irregularly quadrilateral, with its anterior and external angle projecting beyond the second, which is also very irregularly quadrilateral, with its posterior and internal angle much elongated. The remaining marginal plates are all nearly quadrilateral; the posterior and external angle of the ninth, tenth, and eleventh, project so much as to give a serrated appearance to the shell.

The sternum is full and entire in front, emarginate behind; the gular plates are regularly triangular, the apex of the triangle directed backwards; the brachial plates are irregularly quadrilateral, the outer margin being rounded and most extensive; the thoracic plates are quadrilateral, and narrow in the antero-posterior direction; the abdominal are hexagonal and broad; the femoral and sub-caudal are irregularly quadrilateral and large. Of the supplemental or connecting plates, the axillary is elongated and quadrilateral, the inguinal is triangular.

The head is remarkably small and narrow; the snout a little pointed; the nostrils are in front, and near together: the eyes are large, and placed near the snout; the pupil dark, the iris golden. The upper jaw is slightly emarginate in front; the lower, furnished with a small tooth.

The anterior extremities are long, with a row of large square folds of skin along the superior border of the forearm, beginning at the humerus; the anterior surface of the forearm is covered with large scales, the posterior surface, with smaller; the carpus is broad; the fingers five in number, and palmated, furnished with five nails; the three intermediate ones are straight, and of great length; the posterior extremities are long and very flat; the tarsus and metatarsus greatly expanded; the toes are remarkably palmated, and furnished with four long nails.

Colour. The whole superior surface of the shell is dark brown, and is subdivided by broad yellow lines into spaces of various shapes and sizes, each space being occupied by narrower concentric lines of the same colour. The marginal plates have each a broad yellowish band extending through the middle in a vertical direction; at each extremity of the plates are yellow spots, and one or more semicircular lines of the same colour; these meeting with the lines of the adjoining plates form a complete circle, in which are enclosed two yellow spots. The colour of the sternum is a dirty yellow, with a black blotch at the external border of the thoracic and abdominal plates.

The head is dark brown; a yellow line begins at the snout, runs between the eyes, increasing in breadth, and terminates behind the orbit; another line of the same colour begins behind the orbit, small at first, but increasing in size till it forms a large yellow blotch, out of which issues another yellow line which runs along the neck. Below these lines are two broad yellow bands, also beginning behind the orbit; these communicate by a vertical band passing over the anterior part of the tympanum, and are afterwards continued along the neck. A small yellow line begins on each side, beneath the nostrils, and is continued to the middle of the upper jaw; another line of similar colour goes from the centre of the chin, and extends across the throat, from the posterior part of which is extended along the lower jaw and neck a broad band, which is continuous at the articulation of the jaw, with the band passing down from the orbit; on the throat is another large blotch, from which are extended posteriorly one or two yellow lines.

The colour of the anterior extremities is dark brown in front, with a large yellow longitudinal band above extending throughout, and one or two smaller and less extensive above. The posterior extremities are dark brown, with large longitudinal yellow bands along the nates and posterior part of the thighs, and smaller ones on the superior surface of the thigh and leg; on the inferior surface of the thigh and leg are several very extensive yellow bands and blotches, all ending at the tarsus; the membrane between the toes is marked with a longitudinal yellow line; the tail is dark brown above and below, with two longitudinal yellow lines.

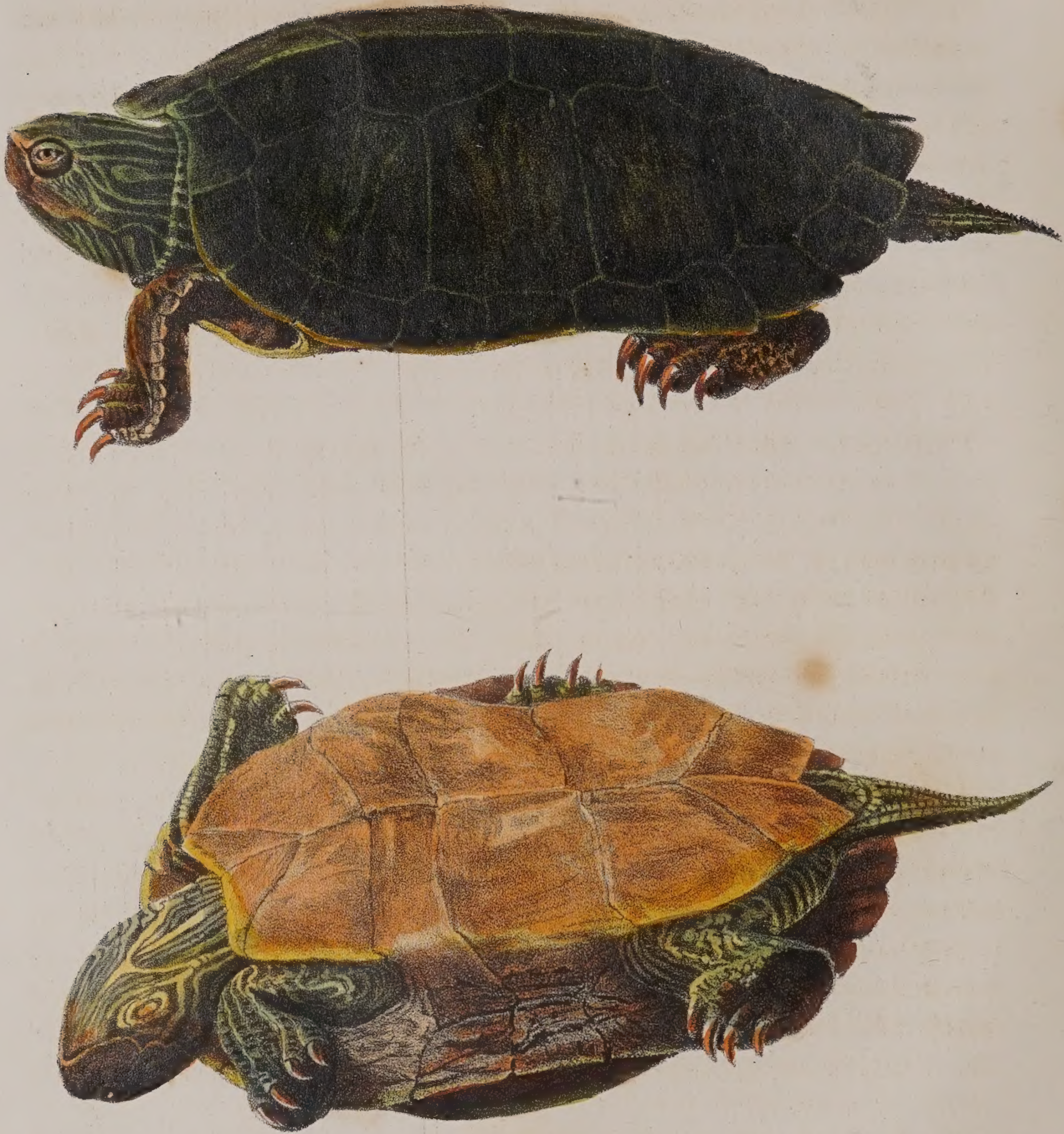
Dimensions. Length of shell, 12 inches; of sternum, 9½ inches; breadth of shell, 7 inches; height of shell, 3 inches; length of tail, 3 inches; length beyond the vent, 1½ inch.

Geographical Distribution. It is found in our western waters. Professor

Troost, of Nashville, Tennessee, has furnished me with a living specimen from the Cumberland river.

Habits. We know but little of the habits of this animal, but from its structure it appears to be eminently aquatic.

General Remarks. I have been led to give the name hieroglyphica to this species from the peculiar disposition of the yellow lines and spots on the marginal plates, which at a first view bear a strong resemblance to hieroglyphic characters.



Emys megacephala

3

Sera pinxt

On Stone by G. Lehman

Lehman & Duval Lith^{rs} Philad^{a}

EMYS MEGACEPHALA.

Plate III.

Characters. Shell suboval, flattened, carinate, serrated and acute posteriorly; very dark brown, with obscure orange lines; sternum oblong, slightly emarginate behind, dingy yellow; head very large; jaws entire.

Description. The shell is suboval, slightly emarginate in front, serrated and pointed behind, and flattened above, with a marked carina throughout its whole extent. The vertebral plates are five in number; the first irregularly hexagonal, with the posterior border curved and projecting into the anterior margin of the second plate, which is also hexagonal, with its anterior margin excurved; the third and fourth plates are hexagonal; the fifth almost semicircular in shape, and the part representing the diameter of the semicircle is joined to four marginal plates. The first lateral plate is triangular, with its basis rounded and connected with five marginal plates; the second and third are hexagonal, with an acute angle above, passing in between the vertebral plates; the fourth is pentagonal. Of the twenty-five marginal plates, the nuchal or intermediate one is irregularly quadrilateral, narrow before, broader behind, its posterior margin slightly excurved, for receiving a small part of the first vertebral plate; the first marginal plate is pentagonal, broadest in front; the remaining plates are quadrilateral; the fourth, fifth, sixth and seventh, have revolute margins; the eighth, ninth, tenth and eleventh, have their posterior and inferior angle lengthened, which gives the posterior margin of the shell a serrated appearance; the two supra-caudal are elevated (en toit.)

The sternum is oblong, entire in front, slightly emarginate and concave behind. Of its twelve plates, the gular are very regularly triangular, having the apex of the triangle directed downwards; the brachial plates are irregularly quadrilateral, with the external and posterior angle prolonged; the thoracic are quadrilateral, extensive in the transverse, and narrow in the antero-posterior direction; the abdominal plates are hexagonal and broad; the femoral, irregularly quadrilateral, broad and rounded externally, narrow and straight within; the subcaudal plates are very irregularly quadrilateral, their outer and posterior angles rounded. Of the supplemental plates, the axillary is triangular, with its external and posterior angle truncated; the inguinal is regularly triangular.

The head is extremely large, narrow before, very broad behind and prominent above, from the elongated occipital process, placed on a short thick neck; the snout is rather pointed. The nostrils are in front, and near each other. The eyes are large and prominent, placed near the snout; the pupil is dark, and the iris golden. The upper and lower jaw have their cutting margins entire.

The anterior extremities are short, with transverse rows of large scales on the anterior part, and a very remarkable row on the posterior surface, above the carpus; a range of large fleshy folds extends along the superior border of the forearm to the humerus; the fingers are five in number, each furnished with a short curved nail. The posterior extremities are long, flattened, and covered with scales, ending in five toes broadly palmated, and furnished with four nails. The tail is small, minutely carinated, and pointed.

Colours. The shell is very dark brown, with a tinge of green, only perceptible in a strong light, and margined with a border of obscure yellowish brown. The lateral and marginal plates are marked with indistinct anastomosing lines of brownish orange; the inferior surface of the latter, with longitudinal lines of obscure white. The sternum is of a dingy yellow colour; the wings and supplemental plates marked with waving brownish lines.

The head and neck are brown, with a strong tinge of green; the jaws are yellowish brown; a longitudinal line of greenish-yellow begins at the snout, and is continued backwards, between the orbits, and terminates at the occiput; two other lines of the same size and colour begin behind the orbits on each side, and are continued along the superior surface of the neck; at the distance of a fourth of an inch at the back of each orbit, is a greenish-yellow blotch; the inferior surface of the neck is dark green, and marked with yellowish lines; one of these begins at the chin, and soon subdivides, the branches running towards the articulation of the lower jaw, whence it is continued along the neck. Beginning where the latter line subdivides, is another longitudinal and larger line, running along the middle of the throat; on each side of these principal lines are many others, both on the cheek and throat; near the angle of the mouth is a remarkable yellow blotch, surrounded by yellowish concentric lines; another blotch is found in front of the tympanum, whence it descends, terminating in a line that runs along the lateral and inferior borders of the neck.

The anterior extremities are coloured like the neck, with two or three longitudinal lines of dirty yellow. The general colour of the posterior extremities is like the anterior, with transverse bands of dirty yellow. The superior surface of the leg and foot are dark green; the inferior surface is of the same colour, marked with blotches and longitudinal lines of greenish-yellow. The tail is greenish-brown, marked with longitudinal lines of dingy yellow; these lines are distinctly marked only as far as the vent.

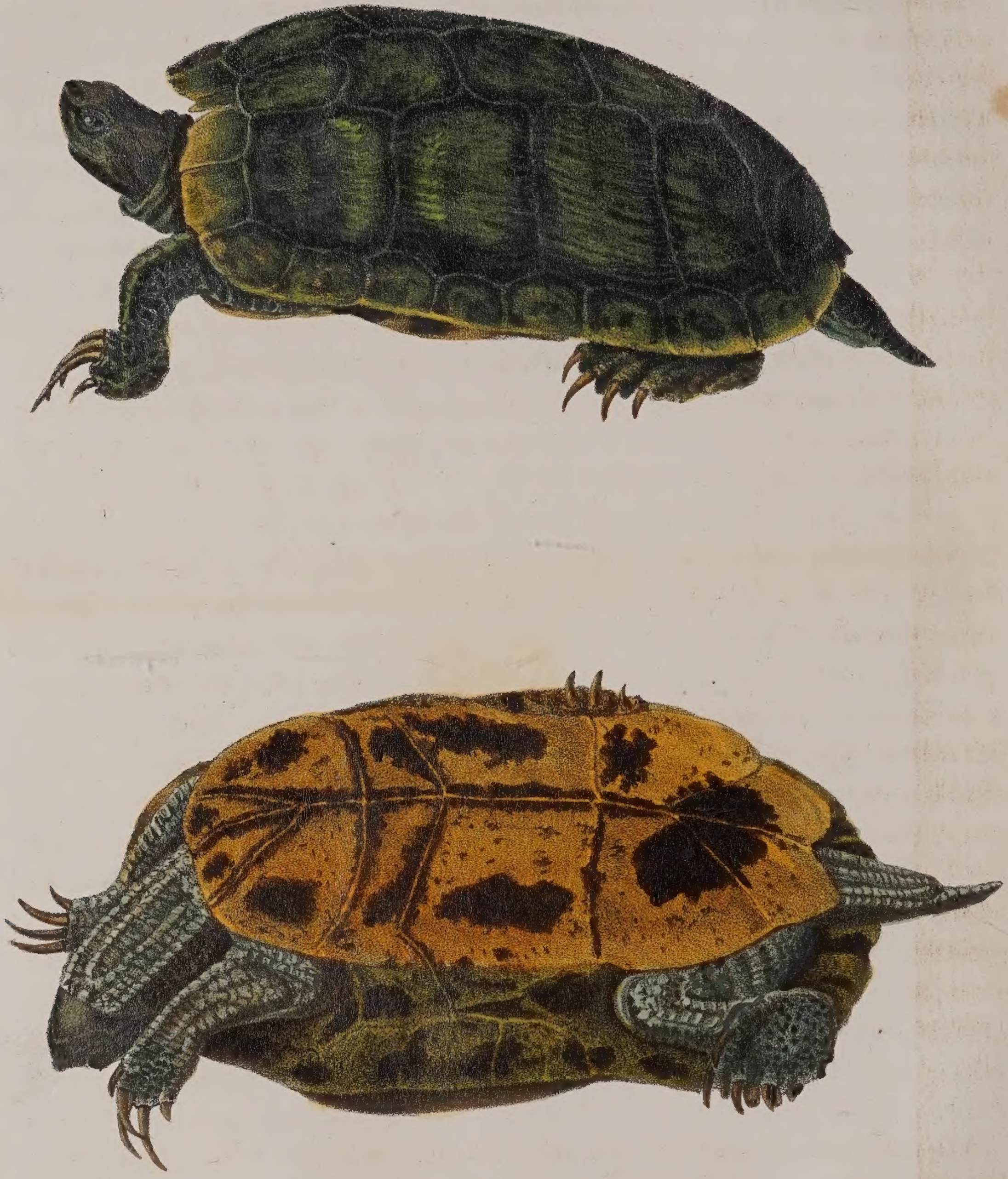
Dimensions. Length of shell, 8¼ inches; of sternum, 7 inches; height, 3 inches; breadth of shell, 6 inches; length of tail, 2½ inches; length beyond the vent, 1¼ inches.

Geographical Distribution. This animal has been observed by Prof. Troost in the Cumberland river, and other western waters. The specimen from which the accompanying drawing was taken, was found by him in the neighbourhood of Nashville, Tennessee.

Habits. The E. megacephala is bolder and more active than the animals of this class generally, approaching even the Chelonura in its disposition to bite when disturbed.

General Remarks. Though having the general characters of the Emys tribe, the E. megacephala might, from the great size of the head, almost form the type of a new genus, approaching in this respect the *Platysternon* of Gray,* from which it differs however, among other characters, in being able to draw the head under the shell.

* Zool. Jour., Lond., Part I., p. 106.



Emys Troostii

4

Sera pinx^t. *On Stone by G. Lehman* *Lehman & Duval Lith^rs Philad^a*

EMYS TROOSTII.

Plate IV.

Characters. Shell blackish, sub-round, depressed, ecarinate; posterior part of the margin very slightly serrated; lateral and marginal plates marked with blotches or lines of horn colour; sternum broad, dirty yellow, each plate having a large black spot near its centre; head long, narrow; upper jaw emarginate; lower jaw furnished with a tooth.

Description. The shell is depressed, ecarinate, sub-round, and slightly serrated behind: its surface is smooth above and slightly wrinkled on the sides, more particularly at the junction of the lateral plates. Of the five vertebral plates, the anterior is pentagonal, the second, third and fourth, hexagonal; the second has its anterior, and the fourth its posterior margin re-entering, to receive the borders of the adjoining plates; the fifth vertebral plate is triangular, with a rounded basis. The first lateral plate is irregularly triangular, with its basis united to four marginal plates; the second and third are pentagonal, with an acute angle passing upwards between the vertebral plates; the fourth is quadrilateral. The marginal plates are twenty-five in number; the nuchal or intermediate one is almost linear, its anterior extremity pointed; the adjoining plates pentagonal, with their anterior border emarginate, the outer and anterior angle extending beyond the second marginal plate, which, like all the others, is quadrilateral; the four posterior plates are very slightly serrated.

The sternum is oblong, full and entire in front, and slightly emarginate behind. The gular plates are triangular, with the apex of the triangle directed backwards; the brachial plates are irregularly quadrilateral, broad without and narrow within, where they unite in the mesial line; the thoracic and abdominal plates are both quadrilateral, the former very narrow, the latter broad; the femoral plates are shaped like the thoracic, but are larger; the sub-caudal plates are triangular, with the posterior and external angles rounded. Of the supplemental plates, both the axillary and the inguinal are quadrilateral; the former has its posterior and internal, and the latter its anterior and internal angle elongated.

The head is small, oval, and pointed. The eyes are large and prominent; the pupil black, the iris dark gray, with a very narrow gilded border surrounding the pupil; the lower lid is large and very movable; the nostrils are small and near each other; the upper jaw is emarginate in front; the lower jaw, furnished with a tooth.

The anterior extremities are covered in front with small scales; on their posterior surface is a remarkable transverse row of four large scales; the fingers are five in number, palmated, and furnished each with a nail; the three intermediate ones are long and curved. The posterior extremities are long and flattened; the toes, five in number and broadly palmated; the four internal ones only are furnished with nails. The tail is short, conical, and obtuse.

Colours. The shell is greenish-black, with a lighter tinge of horn colour in the central part of each lateral plate, from whence lines of the same colour extend downwards and outwards. The marginal plates have each a slight dash, and sometimes a line of the same colour. The sternum is brownish-yellow, with a large black blotch on each plate, and also on the outer margin of the thoracic and abdominal plates; at each extremity of the inferior surface of the marginal plates is a black spot, uniting with those of the adjoining plates. The spots on the sternum are, however, liable to become blended, or altogether obsolete, perhaps the effect of age.

The head is black above, relieved with very obscure rays of brownish-yellow; an oblong mark of the same colour begins at the back of the orbit of the eye, and is lengthened out into a narrow line along the lateral and superior part of the neck; another and more distinct greenish-yellow line is observed along the lateral and inferior part of the throat, increasing in size to the junction of the jaws, where it subdivides into two branches; the one going to the upper jaw, terminates at its posterior part, that running to the lower jaw, ends midway between the condyle and symphysis. Beginning at the chin is another broad pale straw-coloured line, which subdivides after a short distance, the branches continuing along the inferior surface of the neck; a third line begins near the point of subdivision of the last, small, but increasing in breadth, and running nearly in the middle of the inferior surface of the neck; between these lines are many intermediate ones, smaller and less distinct.

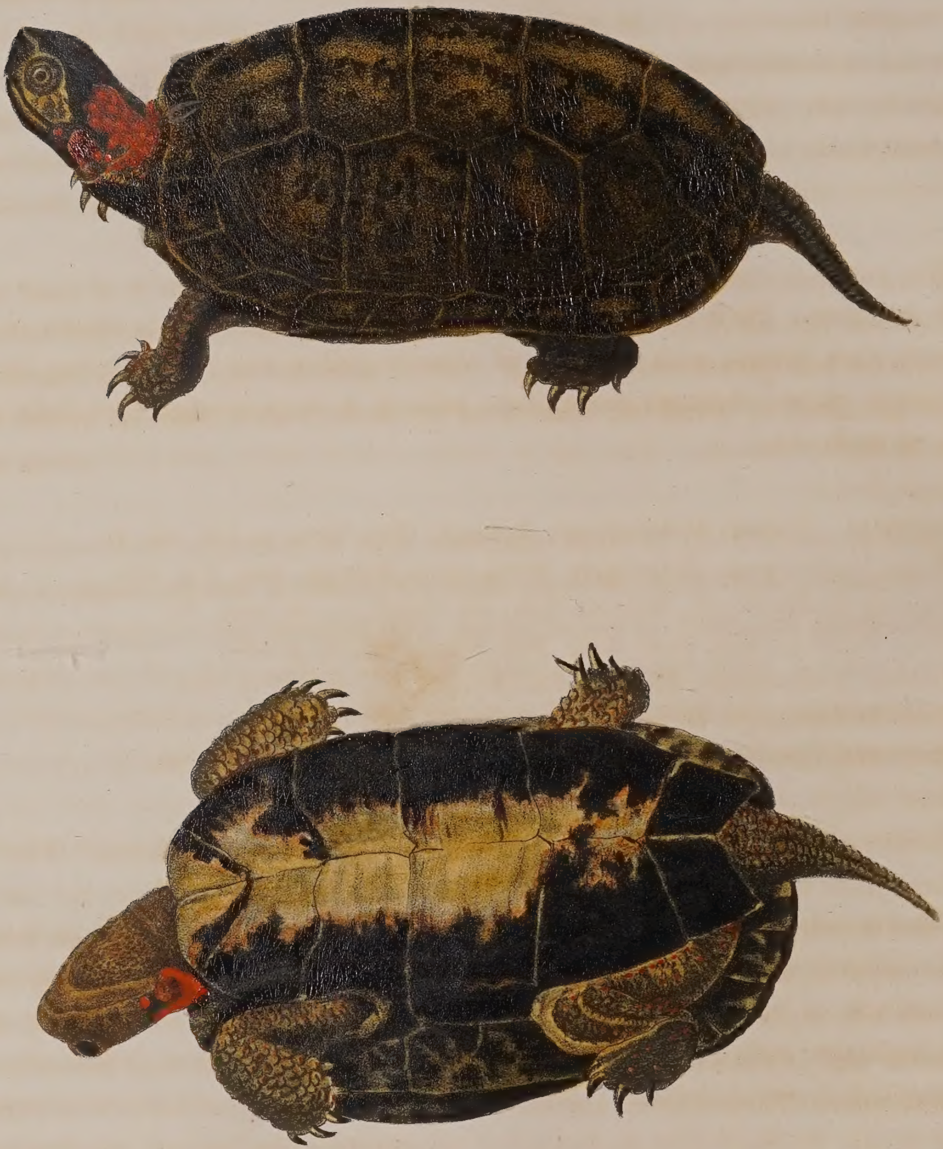
The anterior extremities are black in front, with a broad palish straw-coloured band near the lower part; the inferior border is yellow; the posterior surface blackish-brown. The posterior extremities are black above, with a yellowish line along the posterior margin of the thigh, and blackish below with two or three interrupted yellow lines. On the lower extremity of the thigh is a large triangular spot; the apex of which triangle is continued into a line along the anterior and inferior border of the leg to the root of the first toe. The tail is black above, and blackish-brown beneath with blotches of greenish-white; towards the extremity on each side is a lateral yellowish-green line.

Dimensions. Length of shell, 8 inches; greatest breadth, 7¼ inches; length of sternum, 6¼ inches; length of tail, 2¾ inches; length beyond the vent, 1¼ inch; height of the animal, 2¾ inches.

Geographical Distribution. These animals abound in our western rivers. The accompanying plate was taken from a fine specimen sent me from the Cumberland river by Professor Troost, who has done so much to elucidate the natural history of that part of the United States, and to whom I have dedicated the species.

Habits. I am not aware that the E. Troostii differs in its habits from the other animals of its tribe.

General Remarks. It is remarkable that the animal from which the accompanying figure was taken had six vertebral plates, and that apparently not the result of injury. Another specimen possessed the usual number, and the shell was broader in proportion.



Emys Muhlenburgii.

5

Sera pinx^{t}

On Stone by G. Lehman

Lehman & Duval Lith^{rs} Philad^{a}

EMYS MUHLENBERGII.—*Schweigger.*

Plate V.

Characters. Shell oblong, a little contracted at the sides, entire, slightly carinate, dark brown, with blotches of obscure yellow and sub-radiating lines on the lateral plates; sternum emarginate behind; a large orange spot behind the head, on each side.

Synonymes. Testudo Muhlenbergii, *Schoepff*, Hist. Test., p. 132. tab. 31.
Emys Muhlenbergii, *Schweigger*, Prod. Arch. Kœnigs., tom. i. p. 310.
Chersine Muhlenbergii, *Merrem*, Syst. der Amph., p. 30, spec. 35.
Emys biguttata, *Say*, Jour. Acad. Nat. Scien., vol. iv. p. 212.
Testudo Muhlenbergii, *Leconte*, Ann. Lyc. N. Y., vol. iii. p. 119.
Emys Muhlenbergii, *Gray*, Synop. Rept., p. 25.
Emys Muhlenbergii, *Harlan*, Jour. Acad. Nat. Scien., vol. v. p. 25.

Description. The shell is oblong, arched, and slightly carinate. The first vertebral plate is pentagonal, with an acute angle directed forwards; the second, third, and fourth are hexagonal; the fifth is irregularly pentagonal, with its inferior border joined to four marginal plates. The first lateral plate is irregularly triangular, with its apex truncated and joined to the second vertebral plate, its basis is rounded and joined to four marginal plates; the second and third lateral plates are pentagonal. There are twenty-five marginal plates; the nuchal is very narrow, almost linear; the first marginal plate is irregularly quadrilateral, the remainder, very regularly quadrilateral; the fourth, fifth, sixth, and seventh are narrow and inclined backwards; all these plates are marked with radiating striæ and concentric furrows in the young animal. The sternum is oblong and deeply emarginate behind; the gular plates are convex, triangular with the apex directed backwards, the lateral angles and the sutures straight, projecting a little; the brachial plates quadrilateral, the internal border short and straight, the external longer and rounded; the thoracic, femoral, and abdominal plates are quadrilateral, and more extensive in the transverse than in the antero-posterior direction; the sub-caudal are rhomboidal. The supplemental plates are unusually small; the axillary, circular, and the inguinal, slightly triangular.

The head is short and broad; the tip of the snout pointed; the nostrils are small and near together; the eye is large, the pupil dark, with the iris brown, and surrounded by an orange coloured circle. The jaws are strong and cutting; the upper deeply notched, with a tooth on each side; the lower is furnished with a single tooth.

The extremities approach in their structure those of the Cistudo, in being but slightly compressed, and in having the nails short and very slightly curved. The anterior extremities are covered with scales, larger in front and smaller behind; the fingers are five in number, and but slightly palmated, each furnished with a nail. The posterior extremities are flattened, and covered with small scales; the toes are five in number and imperfectly palmated; the four internal ones only are provided with nails. The tail is large and nearly conical, thick at the base and pointed at the extremity; its superior surface is covered with scales.

Colour. The shell is very dark brown, almost black; all the plates are relieved by blotches of obscure yellow, mingled with pale brown; in some individuals the plates are marked by sub-radiating lines, of the same colour as the blotches. The sternum is almost black at the margin, and bright yellow, approaching to orange, in the middle, sometimes varied with red. Black however, often predominates both on the shell and sternum.

The head is black; a short indistinct yellow line runs from the snout to the orbit of the eye, which is partially surrounded by a circle of the same colour; the upper jaw is yellow, mingled with brown, and marked with blotches of a darker shade of brown and occasional spots of orange; the lower jaw is brownish-yellow, with a few spots of orange. The neck is dark brown above, with two very remarkable spots on each side behind the occiput, varying in different individuals from bright yellow to deep orange, almost red; these spots vary also in size and shape, they are sometimes small with regular margins, at other times they resemble blotches: the inferior surface of the neck is yellowish-brown, studded with small black spots.

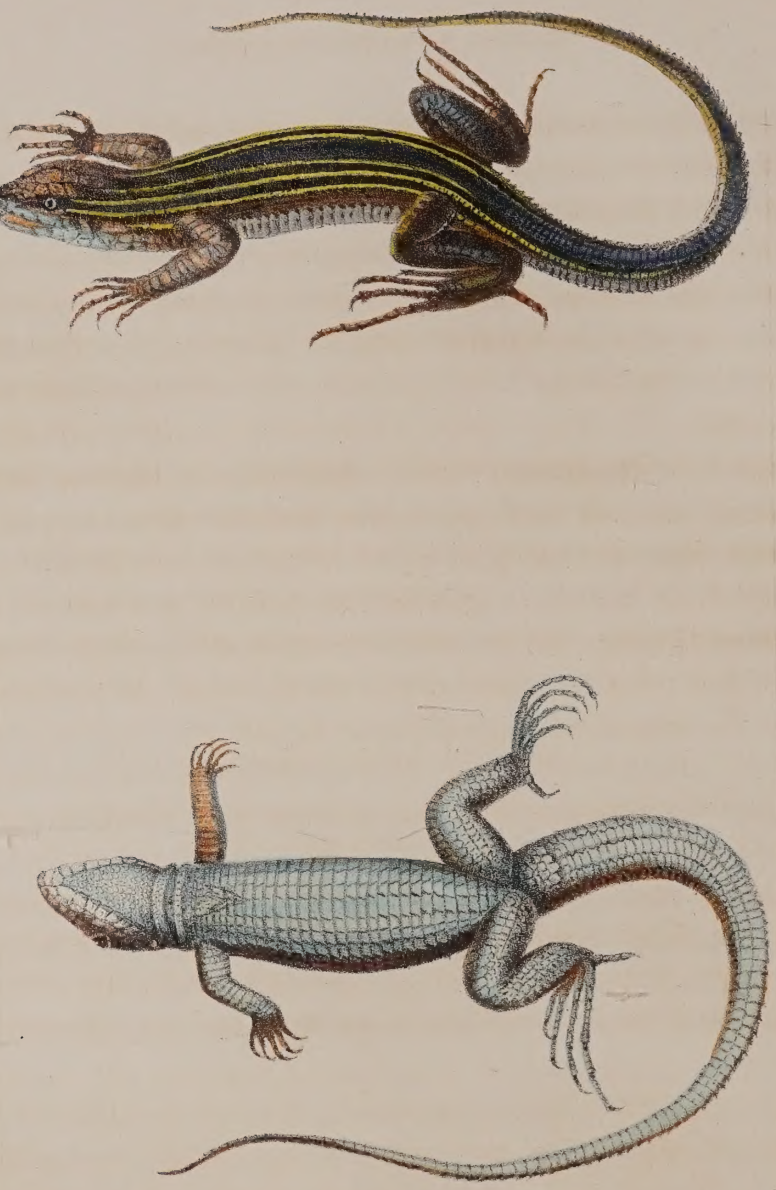
The anterior extremities are brownish-yellow; many of the scales are tinged with orange; a dark line runs along the outer margin of the forearm. The posterior extremities are dark brown on the upper surface, with occasional spots of orange about the foot; the inferior surface is brownish-yellow, with one or two lines of lighter yellow. The tail is dusky yellow above, and yellow tinged with orange, below.

Dimensions. Length of shell, $3\frac{3}{4}$ inches; sternum, $3\frac{1}{4}$ inches; height, $1\frac{3}{8}$ inches; tail, $1\frac{1}{8}$ inches.

Geographical Distribution. Its range is very limited; it being only found in New Jersey and East Pennsylvania, and rare even in these districts.

Habits. The E. Muhlenbergii lives in small brooks or streams of running water.

General Remarks. This animal was first described and figured by Schoepff, in his Historia Testudinum, from specimens furnished him by the Rev. Mr. Muhlenberg of Pennsylvania. Schoepff however, mistook it for a variety of the Box Tortoise, and gave a drawing of the shell and sternum only. Say next described it in detail, under the name E. biguttata, from the two remarkable orange spots on the neck; he was probably not aware that Schoepff had previously given it another name. Leconte has since described this animal with an accuracy that leaves nothing to be desired.



Ameiva-sex-lineata.

6.

Sera pinx^{t} *On Stone by G. Lehman* *Lehman & Duval Lith^{rs} Philad^{a}*

AMEIVA.—*Cuvier.*

Genus Ameiva.—Characters. Body elongated, covered with minute scales; head pyramidal, covered with plates; jaws furnished with many notched teeth; tongue slender, bifid; no bony plate on the orbits; abdomen covered with rows of large scales; a range of pores beneath each thigh; tail long, cylindrical, and covered with verticillated scales.

AMEIVA SEX-LINEATA.

Plate VI.

Characters. Body elongated; dark brown above, marked with six yellow longitudinal lines; abdomen bluish silvery white; head short, obtuse; tail cylindrical, very long, and covered with verticillated scales.

Synonymes. Lacerta sex-lineata, *Linnæus,* Syst. Nat., tom. i. p. 364; exclus. syn. *Catesby.*
Lacerta sex-lineata, *Gmelin,* ed. Syst. Nat., tom. iii. p. 1074.
Le Lézard à six raies, *Bosc,* Nouv. Dict. d'Hist. Nat., tom. xvii. p. 527.
Le Lézard à six raies, *Daudin,* Hist. Nat. des Rept., tom. iii. p. 183.
Six-lined Lizard, *Shaw,* Gen. Zool., vol. iii. Part. I. p. 240.
Lacerta sex-lineata, *Harlan,* Jour. Acad. Nat. Scien., vol. vi. p. 18.
Striped Lizard, *Vulgo.*

Description. The head is short, compressed laterally, and covered with small plates. The vertical plate is pentagonal, with an acute angle forwards; there are three supra-orbital plates on each side, that supply the place of a bony plate to the orbit; the snout is more obtuse than usual, terminating in a single plate. The nostrils are lateral, and placed near the extremity; the eyes are small, with a black pupil and a golden iris; the inner margins of the eyelids are bordered with a very narrow band of bright yellow; the membrane of the tympanum is apparent, and of a palish white colour; the entrance to it is round, and of large size. The upper jaw is covered with a row of small square plates; the lower jaw has two rows of the same form, the plates in the inferior row being largest. The throat is covered with small scales, and has two transverse folds in front of the anterior extremities.

The body is elongated, and covered on the back and sides with minute scales; the scales of the abdomen are large and arranged in rows, of which those nearest the middle are largest. The tail is very long, perfectly cylindrical, and covered with verticillated scales; the vent is transverse, with large scales in front and small ones behind.

The anterior extremities are rounded, scaly above, granulate below; and have five fingers, each furnished with a delicate, short and curved nail. The posterior extremities are also scaly above, the scales being so minute as to make the surface appear granulated; the under surface of the thigh and leg is covered with very large scales; and along the posterior and inferior part of the thigh is a range of pores. There are five toes, each furnished with a nail similar to those of the fingers.

Colour. The head is dusky brown; the upper jaw bluish-white, the lower nearly of a silvery-white colour. Along the back extends, from the occiput to the tail, a purple or brownish band, on each side of which are three yellow or golden longitudinal lines; of these, the superior is the palest and shortest; it begins at the occiput and terminates at the tail; the other lines are much longer and brighter, the upper one beginning above the orbit and extending to the middle of the tail; the lower line begins below the eye, and runs above the tympanum, along the flanks to the anterior part of the thigh; a shorter and more indistinct line extends from the angle of the mouth, below the tympanum, to the shoulder; the spaces between these longitudinal bands are jet black. The throat is silvery white, and the abdomen of a beautiful shining bluish-white colour.

The upper surface of the tail is nearly similar in colour to the back, but appears much rougher from the verticillated scales; its inferior surface is whitish. There are two longitudinal lines on each side of the tail; the superior one is continuous with the middle yellow longitudinal line of the back, and terminates about the middle of the tail; the inferior line is paler; it begins back of the thigh, runs nearly to the extremity of the tail, and seems to divide the upper or darker portion from the inferior or whiter part.

The anterior, as well as the posterior extremities, are brownish above and bluish white below; and along the posterior part of the thigh runs a whitish line, continuous with the inferior longitudinal line of the tail.

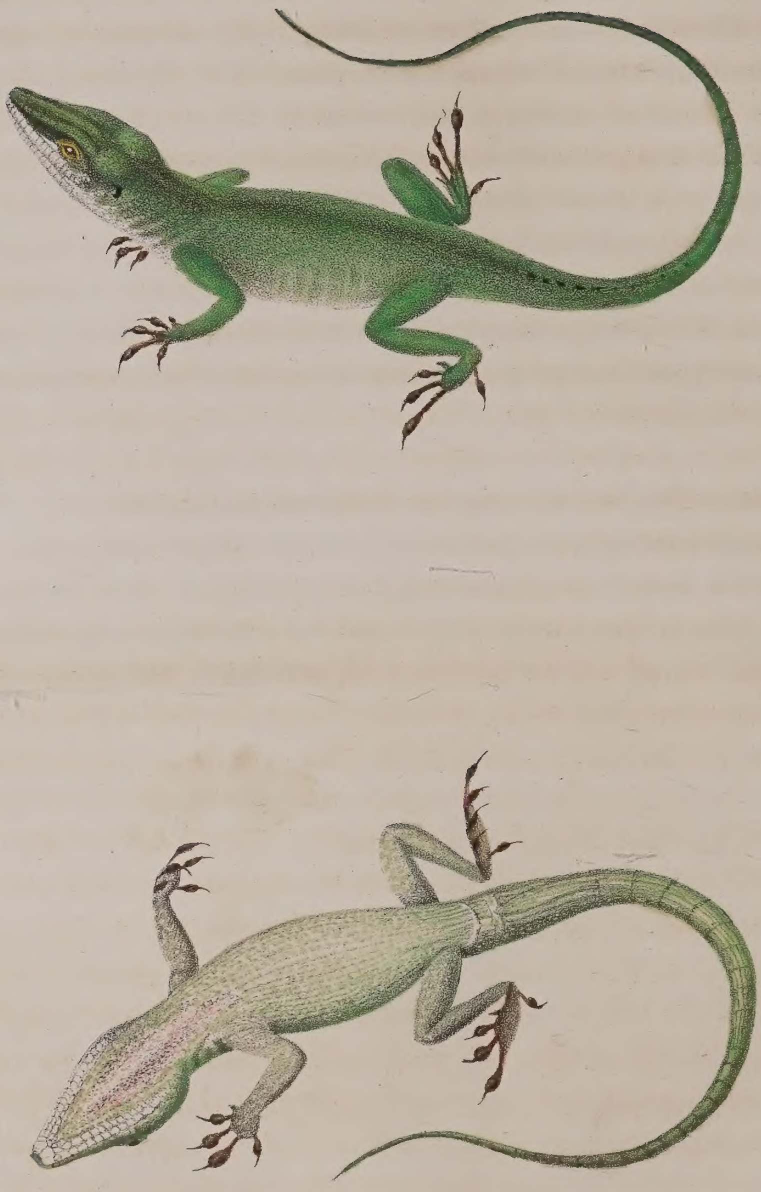
DIMENSIONS. Total length, 9¾ inches; head and body, 3¼ inches; tail, 6½ inches.

GEOGRAPHICAL DISTRIBUTION. The Ameiva sex-lineata is numerous in the Carolinas, and is found throughout Georgia and the Floridas: how much further west it may exist cannot now be determined.

HABITS. This is a very lively, active animal, choosing dry and sandy places for its residence, and is frequently met with in the neighbourhood of plantations, or near fences and hedges; most usually it is seen on the ground in search of insects, but it will take to trees when pursued: its motions are remarkably quick; it runs with great speed, and climbs with facility, yet it cannot leap from branch to branch, or from tree to tree, like the Anolius Carolinensis. The Ameiva sex-lineata is very timid; it feeds on insects, and generally seeks its food towards the close of the day, when they may be seen in cornfields far from their usual retreat; and not unfrequently I have met male and female in company.

GENERAL REMARKS. This animal was certainly first described by Linnæus, under the name Lacerta sex-lineata, from a specimen sent him by Dr. Garden, of Charleston, who furnished him with numerous rare specimens of plants and animals from Carolina. He observes of it, "Femora postice, ordine papillari ut in Ameiva." It is impossible at this time to understand what led him to consider this animal as the Lion Lizard of Catesby, (vol. ii. tab. 68,) with which it agrees neither in colour, habits, nor geographical distribution. The Lion Lizard is of a "uniform gray colour, streaked with lines of a lighter gray;"—"it frequents the rocks on the coasts of Cuba and Hispaniola, and is often the prey of sea-gulls." It is remarkable that most Naturalists since Linnæus have copied this error, and given the same reference.

The habits of the Ameiva sex-lineata closely approximate it to the true Lizards, of which we have none in the United States, and it may fairly be considered their representative here. It differs from Lacerta in several parts of its organization—as in wanting palatine teeth, and a bony plate to the orbit, &c., which structure brings it within the genus Ameiva.



Anolius Carolinensis.

7.

Sera pinx^{t} On Stone by G. Lehman. Lehman & Duval Lith^{rs} Philad^{a}

ANOLIUS.—*Cuvier.*

Genus Anolius.—Characters. Head elongated; jaws and palate furnished with small, sharp, notched teeth; tongue soft, fleshy, neither cleft nor extensile; body elongated, covered with minute scales; tail cylindrical, very long, verticillated; the skin beneath the penultimate joint of the fingers and toes is spread out into an oval disk, transversely striated.

ANOLIUS CAROLINENSIS.—*Cuvier.*

Plate VII.

Characters. Head flattened and greatly elongated, covered with minute scales; nostrils distant from the end of the snout; tail very long, verticillate; a dilatable sac under the throat; fingers and toes elongated.

Synonymes. Lacerta viridis Carolinensis, *Catesby*, Carolina, &c., vol. ii. tab. 65.
Anolius Carolinensis, *Cuvier*, Regn. Anim., tom. ii. p. 50.
Anolius bullaris, *Harlan*, Jour. Acad. Nat. Scien., vol. vi. p. 16., non Linn.
Dactyloa, *Wagler*, Naturlich. Syst. der Amph., p. 148.
Green Lizard or Chameleon, *Vulgo.*

Description. The head is very much elongated and slightly flattened, canaliculated between the orbits, full and rounded at the temples; the snout is rather obtuse; the nostrils are directed upwards and outwards, and are placed at some distance from the end of the snout; the eyes are rather small, but brilliant; the pupil black, the iris burnished gold; the membrane of the tympanum is visible, the entrance to it, contracted, very small; mouth large; the jaws are covered with small whitish plates. Under the throat is a sac, which can be dilated or distended with air at the will of the animal, when it becomes of a bright vermilion.

The body is elongated, but hardly cylindrical, the abdomen being broader and the spine narrower, giving it at times a triquetrous form. The head and body are covered with scales so extremely minute, as to give the whole surface a granulated appearance. The tail is cylindrical, very long, and covered with larger and verticillated scales.

The anterior extremities are rounded; the skin on the under surface of the penultimate phalanges of the four external fingers, is spread out into an oval disk, with transverse striæ, by means of which the animal can attach itself to smooth surfaces; the fingers are five in number, each provided with a small, short, very delicate and curved nail. The posterior extremities are longer, and terminate in five toes, provided with the same number of nails; the penultimate phalanges are arranged in the same manner as in the fingers.

Colour. The whole superior surface of the head, body, tail and extremities, is of a beautiful golden green; the abdomen, greenish-white; the sac under the throat becomes vermilion when inflated; the inferior surface of the extremities is white, clouded with green; the superior surface of the fingers and toes is brown, and the inferior surface of the same colour. We observe frequently a black band on the temple, and a row of small black dots along the superior surface of the tail, as represented in the accompanying plate; but these all disappear when the animal assumes its greenest tint.

In giving this as the ordinary colour of the Anolius Carolinensis, it must be remembered that the colour varies greatly at different times, according to the season of the year, the weather, health of the animal, activity of the circulation,

&c. In cold weather, and in confinement, it is frequently dark brown, or brown with a vertebral line of white, seeming an entirely different animal; in warm weather it assumes, in the space of a few moments, every variety of shade, from dark brown to the most beautiful golden green. These variations in the colour are so great, and take place so suddenly, that it is often supposed to depend on the will of the animal, or the colour of the substance on which it is placed.

Dimensions. Length from the tip of the snout to the vent, 2¾ inches; length of tail beyond the vent, 4½ inches; total length, 6¾ inches.

Geographical Distribution. The Anolius Carolinensis is first seen about latitude 35° in the Atlantic States, whence its range extends to the Gulf of Mexico, and westward to the Mississippi; and according to Dr. Sibley, as far as Nachitoches, on the Red river.

Habits. The A. Carolinensis is a bold and daring animal, haunting out-houses and garden fences; and in new settlements it even enters the houses, walking over the tables and other articles of furniture in search of flies. It is very active, climbing trees with great rapidity, and leaping with ease from branch to branch or from tree to tree, securing itself even on the leaves, by means of the oval disks of the fingers and toes; which enable it also to walk easily on glass, and on the sides and ceilings of rooms. It feeds on insects, and destroys great numbers, seizing them suddenly, and devouring them, unrestrained even by the presence of man. In general they hybernate later than other animals of the same class; their favourite retreats being gardens and old buildings; they often retire to green houses or conservatories, where they may be frequently seen active, even in winter, but never of that rich yellow-green as in the summer season. In the spring season they are extremely quarrelsome; two males seldom meet without a furious battle, which frequently results in the loss of part of the tail, or some other injury, to one or both of the combatants.* Before the contest, the animal usually remains stationary for a moment, elevates and depresses its head several times, inflates his gular sac, which now becomes of a bright vermilion, and then suddenly springs at his enemy. After the first heats of spring have passed, they become less quarrelsome, and many are seen quietly living together in the same neighbourhood; they retain at all times the habit of inflating the sac, even when quietly basking in the sun; and at those times the colouring of the animal has the liquid brilliancy of the emerald.

---

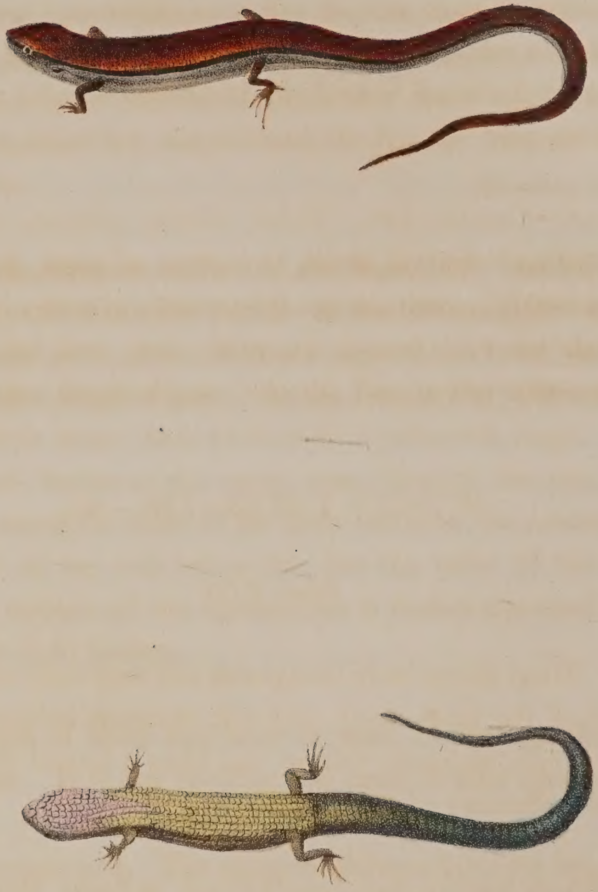
* Le Père Nicholson, in describing the *roquet*, an animal supposed for a long time to be

General Remarks. Catesby was the first who described this animal, under the name of Green Lizard of Carolina,* but he also gives another plate of a similar Lizard of Jamaica.† Linnæus describes the Jamaica species (Lacerta viridis Jamaicensis) as the Lacerta bullaris, and without further reference. Daudin and succeeding writers give an additional reference to the Green Lizard of Carolina; which is the more remarkable, as Catesby himself seemed aware of the difference between these animals, for he gives them different figures and a different geographical distribution. Cuvier was the first since Catesby to recognise the Carolina Anolius as a distinct species, "from the very long flat muzzle and the black band at the temples." It has already been remarked that this band disappears when the animal assumes its greenest tint; we must therefore depend on the "long flattened muzzle" chiefly in determining this species.

identical with ours, has very well described the habits of the Carolina Anolius. Essai sur l'Hist. Nat. de Saint Domingue: Paris, 1776, p. 348.

* Catesby, Carolina, &c., vol. ii. tab. 65.

† Catesby, loc. cit., vol. ii. tab. 66.



Scincus lateralis

8.

Sera pinx^{t} *On Stone by G. Lehman.* *Lehman & Duval Lith^{rs} Phila.*

SCINCUS.—*Daudin.*

Genus Scincus.—Characters. Head oblong, pointed, covered with plates; jaws furnished with closely set teeth; two rows of teeth on the palate; tongue fleshy, slightly extensible, emarginate; tympanum apparent; neck as large as the head; body elongated; tail conical; the whole body and tail covered with small imbricated scales; extremities with free and unguiculated toes.

SCINCUS LATERALIS.—*Say.*

Plate VIII.

Characters. Head short; body elongated; tail very long and cylindrical; whole superior surface of the head, body, and tail, chestnut colour; inferior surface of the neck silvery white; abdomen yellow; tail blue; a lateral line of black from the snout to near the extremity of the tail.

Synonymes. Scincus lateralis, *Say*, Long's Exped. to Rocky Mountains, vol. ii. p. 324.
Scincus unicolor, *Harlan*, Jour. Acad. Nat. Scien., vol. v. p. 156.
Scincus lateralis, *Harlan*, Jour. Acad. Nat. Scien., vol. vi. p. 12.
Ground Lizard, *Vulgo.*

Description. The head is short, about the size of the neck and body; the snout somewhat pointed; the vertical plates are three in number, the first one acute posteriorly; the nostrils are lateral, and placed very near the snout; the eyes, small and black; the tympanum apparent, the entrance large, with its anterior margin destitute of projecting scales: two or three rows of very wide scales usually follow the occipital plates. The body is elongated, somewhat quadrangular in form, and nearly uniform in size throughout; the tail very long, and very gradually tapering. The anterior extremities have five fingers, each furnished with a minute and curved nail; the posterior extremities are rounded, the toes five in number, each with a nail: the inferior surface of the toes is serrated, from the projecting points of the scales or tubercles: the soles of the feet are also studded with small tubercles of equal size.

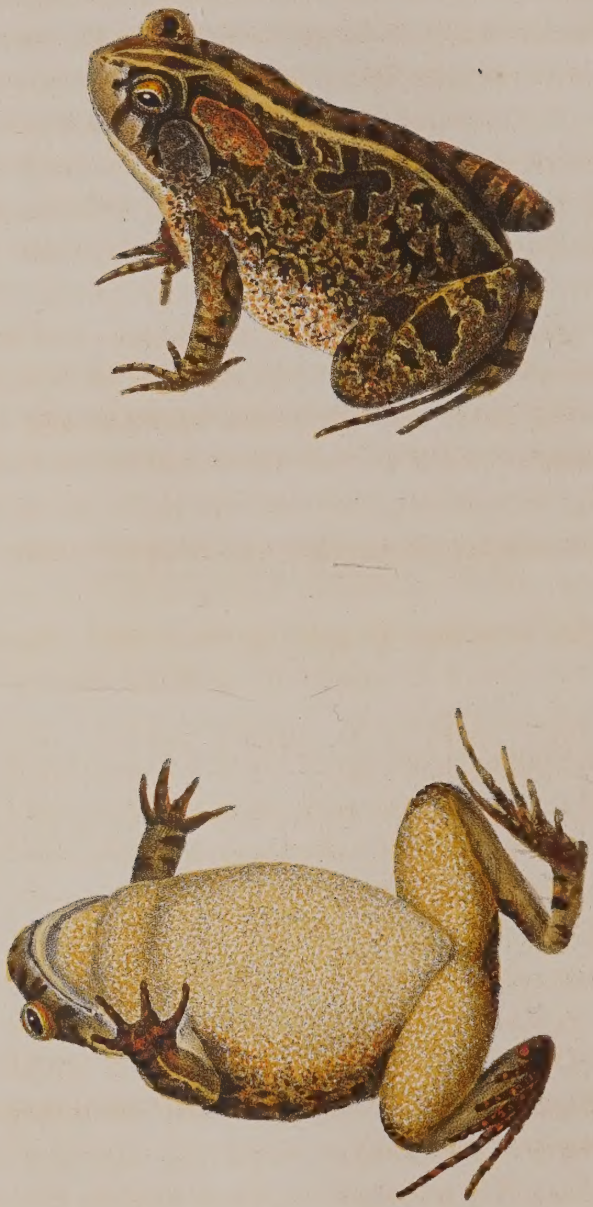
Colour. The whole superior surface of the head, body and tail, is a beautiful chestnut; the inferior surface is silvery-white at the throat, yellow at the abdomen, and this colour extends for a short distance beyond the vent; the lower surface of the tail is blue, with a tinge of gray. In the female, the yellow of the abdomen is but slight, being little more than white with a yellowish tinge. A remarkable lateral line of jet black begins at the snout, runs through the eye, over the tympanum and shoulder, along the sides of the body and over the posterior extremities, to beyond the middle of the tail; below this line the sides of the body are dark gray. The superior surface of the extremities is darker chestnut than the back; the inferior surface is light brown.

Dimensions. Length of head and body to vent, $1\frac{5}{8}$ inches; of tail, $3\frac{1}{8}$ inches; total length, $4\frac{3}{4}$ inches. It is our smallest and most slender species.

Geographical Distribution. The range of Scincus lateralis begins certainly in North Carolina, whence we have received specimens; it extends south as far as the Gulf of Mexico, and is continued westward to the Mississippi river. Dr. Blanding has observed this animal at Camden, S. C., Leconte in Georgia and Florida, Say on the Mississippi; and how much farther west it may exist, cannot now be determined.

Habits. The Scincus lateralis may be seen by thousands in the thick forests of oak and hickory in Carolina and Georgia; they emerge from their retreats after sun-set, in search of small insects and worms, on which they live; yet their motions are so quick, and they disappear so rapidly, that they might at first be easily mistaken for crickets or other insects. Though so numerous, it is difficult to secure them alive; for when approached, they conceal themselves with astonishing quickness under the roots of the old and decaying trees, or beneath fallen leaves, or other vegetable substances; this decaying vegetable matter sometimes forms a stratum several inches thick, containing numerous holes and crevices, to which they can easily retreat. We have never observed it ascend trees in its attempts to escape when pursued.

General Remarks. This animal bears some resemblance in its small size and markings to the Gymnopthalmus of South America; its eyelids are, however, distinct, and it agrees in every respect with the genus *Euprepis* of Wagler. It was first described by Say, in Long's expedition to the Rocky Mountains.



Bufo Americanus.

9.

Sera pinxt *On Stone by G. Lehman* *Lehman & Duval Lithrs Philadelphia.*

BUFO.—*Laurenti.*

Genus Bufo.—Characters. Head short; jaws without teeth; tympanum visible; behind the ear is a large glandular tumour, having visible pores; body short, thick, swollen, covered with warts or papillæ; posterior extremities but slightly elongated.

BUFO AMERICANUS.—*Leconte.*

Plate IX.

Characters. Head short, snout rounded, nostrils placed near the snout; tympanum small; post-tympanal gland narrow and much elongated; body short, bloated; anterior extremities large, fingers free; posterior extremities short, toes semipalmated.

Synonymes. Bufo Americanus, *Leconte.*
Bufo musicus, *Harlan,* Jour. Acad. Nat. Scien., vol. v. p. 344.
Common Toad, *Vulgo.*

Description. The head is short, with the snout almost rounded: the nostrils are small, and placed near the snout: the eyes are large and brilliant; the pupil dark, with the iris presenting a minutely reticulated appearance, of black and gold; the superciliary ridges are but slightly elevated: the membrane of the tympanum is apparent, though small: the post-tympanal glands are narrow and very long, almost semi-cylindrical.

The body is short, thick, and bloated, and has its superior surface covered with warts of different sizes. A longitudinal line of dirty white runs from the occiput to the vent; on each side of this are several conspicuous well-defined spots, varying in colour, size, and shape: we sometimes find them systematically arranged in rows. Along the flanks is a broad but indistinct band, extending to the posterior extremities; this band is so broken as to give the appearance of a row of black and white spots. The abdomen is granulated, and of a dirty yellowish-white.

The anterior extremities are short; their upper surface, dusky with minute spots of white; the lower is of the same colour as the abdomen; the fingers are distinct, but not palmated. The posterior extremities are short, their superior surface ash-colour, with blotches and transverse bands of black, extending to the tarsus; the leg is shorter than the thigh; the toes are semipalmated, and five in number; a large tubercle occupies the place of a sixth, on the metatarsus.

Dimensions. Length from snout to vent, 2½ inches; of thigh, 1 inch; of leg, less than an inch; of tarsus and toes, 1½ inches.

Geographical Distribution. This is the most widely diffused of all the American toads. I have observed them from the mountains of Maine through all the Atlantic States: it is, however, remarkable that this animal leaves the sea shore in the south; for I have never met with it in the low country of South Carolina, although common in the upper districts of the state. Leconte has traced them along the western side of the Alleghanies, and in the valley of the Mississippi.

Habits. This animal is very mild and timid, living under stones or dead or decaying trees, or in holes in the earth, and frequently making its way into cellars, and dark and lonely corners: as evening approaches, it issues from its place of concealment in search of insects, and at these times frequently falls a prey to Snakes and Owls. It may be brought to a partial state of domestication, and will swallow flies from the hand. Early in the spring these animals resort to shallow pools in great numbers, for the purpose of depositing their spawn, and at these times their music is very familiar, consisting of a prolonged trill, continued by different individuals both day and night, and not unpleasant when at a sufficient distance.

The Toad is looked upon with aversion by the greater part of mankind; its swollen body, its warty and tuberculous skin, with the large post-tympanal glands, give it such a repulsive appearance, that it seems hard to believe an innocuous disposition can belong to a shape and colour so offensive to the eye; hence the vulgar have always considered it venomous: it is nevertheless perfectly harmless, destroying only the insects that nature has apportioned for its food. To an unhandsome exterior, however, it often owes its safety, being very abundant and entirely helpless.

It has been commonly supposed that the humour exuding from the skin and glands is poisonous, yet no experiments have proved it so, and certainly no injury has ever arisen from handling or examining the animal. Experiments have been made in Europe with the secretions of the common toad of that continent, and apparently with different results; for Naturalists are still at variance—Laurenti* considered the exudation innocuous, while Oken† believes it poisonous, and his opinion is supported by some interesting experiments of Davy,‡ which prove that "the skin of the European Toad is possessed of minute follicles, secreting a thick yellow fluid of a poisonous nature."

General Remarks. Leconte was the first to separate this toad both from the southern animal, with which it had been confounded, and from the common European species, to which it had been considered similar. It differs from the former in having the superciliary ridges depressed, and from the latter in the shape of the head, post-tympanal glands, &c.

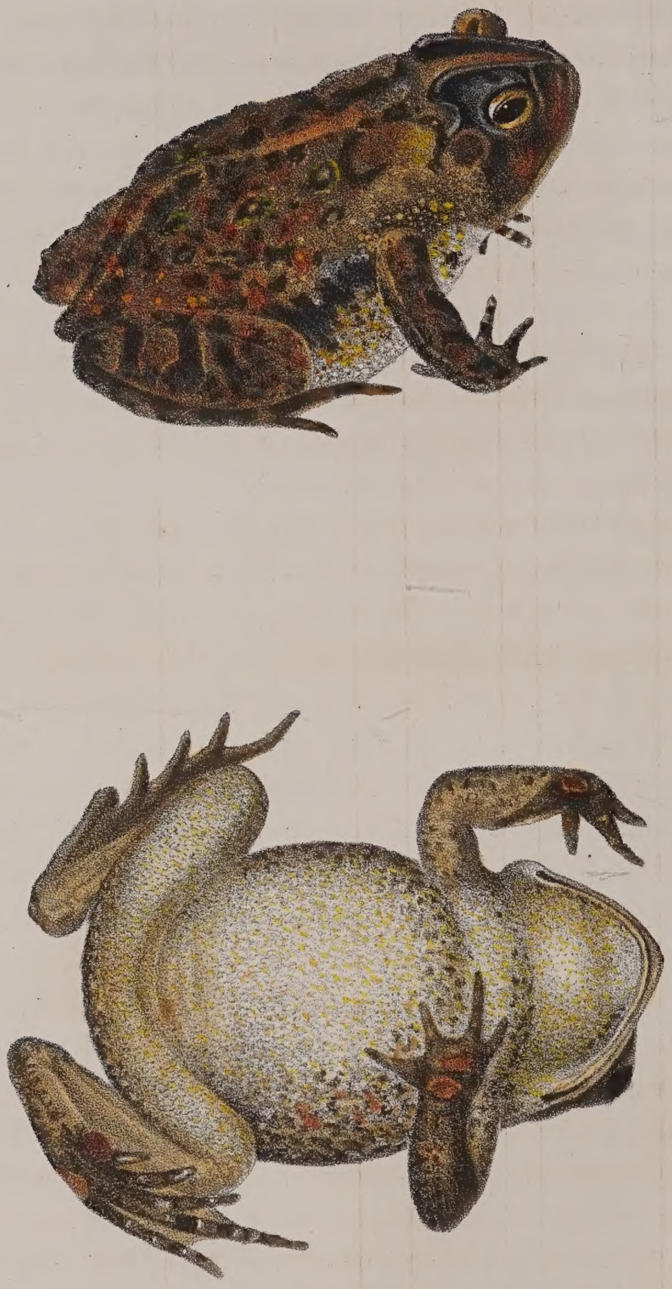
---

* Laurenti, Synop. Rep. p. 195.

† Oken, Zool., B. II., § 198.

‡ Dr. Davy, Phil. Trans. for 1826, Part II., p. 127.

Leconte first proposed calling this animal Bufo Americanus; and although he has never published a description, still it is due to him to retain the name, which seems to me sufficiently appropriate; for although there are many Toads in the United States, there are none so common, so widely extended, and so much like the Bufo communis of the old world. Indeed, we regard it as the representative of that animal in North America, and have taken it as the type of our genus Bufo.



Bufo clamosus

11.

Sera pinx^{t} On Stone by G. Lehman Lehman & Duval Lith^{rs} Philad^{a}

BUFO CLAMOSUS.—*Schneider.*

Plate X.

Characters. Head large; snout obtuse; superciliary ridges greatly elevated; upper jaw emarginate, lower furnished with a tooth in front; body above warty, dusky brown, with a tinge of yellow; beneath granulated, dirty yellowish-white.

Synonymes. Land Frog, *Catesby*, Carolina, &c., vol. ii. tab. 69.
Land Frog, *Bartram*, Travels in Carolina, Florida, &c., p. 279.
Bufo clamosus, *Schneider*, Hist. Amphib., fasc. i. p. 214, No. 8.
Rana lentiginosa, *Shaw*, Gen. Zool., vol. iii., Part I., pl. 53, p. 173.
Bufo musicus, *Daudin*, Rainettes, p. 92, tab. 33, fig. 3;—Hist. Rept., tom. viii. p. 190.
Bufo musicus, *Bosc*, Nouv. Dict. d'Hist. Nat., tom. vi. p. 490.
Bufo musicus, *Merrem*, Versuch. eines Syst. der Amph., p. 181.
Carolina Toad, *Vulgo.*

Description. The head is large, dark coloured, and without warts, except a few small ones on the eyelids. The snout is obtuse, and from its tip runs an elevated bony line, subdividing at the nostrils, and forming the superciliary ridges; these increase in elevation as they reach the posterior part of the orbit, where they terminate in a rounded knob or tubercle; their great height gives to the upper surface of the head a canaliculated appearance: a second ridge descends from each of these, and completes the posterior border of the orbit. The upper jaw is yellowish-brown, and deeply emarginate in front; the lower is white, and furnished at its anterior part with a distinct tooth. The nostrils are small and round, placed near the point of the snout. The eyes are large, prominent, and very beautiful; the pupil is black, the iris reticulated with gold and black, and has an inner margin of yellow. The tympanum is small and dusky, with a minute spot of a lighter shade in the centre. The post-tympanal glands are large and reniform, exuding a pale milky fluid when pressed; the orifices of the canals out of which it flows are evident.

The back and sides are dusky, and covered with warts of different sizes; a pale vertebral line extends from the head to the vent, on each side of which are found the largest warts; an irregular row of spots of yellowish-white exists on the flank, having somewhat the appearance of an indistinct band, extending from the inferior and posterior part of the post-tympanal gland to within a short distance of the thighs. The whole inferior surface of the animal is dirty white, with a strong tinge of yellow.

The anterior extremities are short; the upper surface is dusky, with blotches and bars of dark brown; the lower surface dirty white, tinged with yellow. The fingers are four in number, and cleft. On the outer margin of the carpus, and opposite the thumb, is a large warty tubercle. The posterior extremities are short, dusky brown above marked with blotches and transverse bars of darker brown, and dirty white beneath. The toes are five in number, and semipalmated, the fourth a good deal longer than the others; the metatarsus is furnished with two tubercles or spurs, the outer of which is cartilaginous, and so long as to resemble a sixth toe.

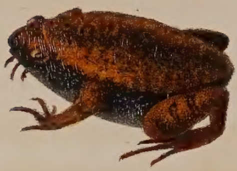
Dimensions. Length of body, 2⅝ inches; of the thigh, 1 inch; of leg, rather less than an inch; of tarsus and toes, 1⅛ inches.

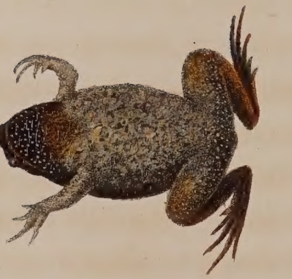
Geographical Distribution. This Toad is found in the Carolinas, Georgia, the Floridas, and Alabama, and without doubt, all along the northern coast of the Gulf of Mexico; its most northern range is in North Carolina or Southern Virginia.

Habits. This animal is timid and remarkably gentle in its habits, remaining concealed during the day in some dark place, and only venturing out as the dusk of the evening approaches. It feeds on various insects, which it seizes while alive and in motion. Catesby says it lives on ants and fire-flies, and will mistake a piece of burning charcoal for an insect of that description. The male seeks the female in the month of May, when hundreds of them may be seen together in some stagnant pool; where having deposited their spawn, they return to the land. The males at this season are extremely noisy, though in general they are silent, making only a slight chirp when taken. Like many of the Hylæ tribe, they have a large sac under the throat, which is distended when the animal croaks.

I have seen an individual kept for a long space of time, which became perfectly tame: during the summer months it would retire to a corner of the room, into a habitation it had prepared for itself in a small quantity of earth placed there for its convenience. Towards evening it would wander about the room in search of food, seizing greedily whatever insect came in his way. Some water having been squeezed from a sponge upon his head one hot day in July, he returned the next to the same spot, and seemed very well pleased with the repetition; nor did he fail during the extreme heat of the summer to repair to it frequently, in search of his shower-bath.

General Remarks. Catesby first described and gave a figure of this animal under the name Land Frog; and although this figure is badly executed, both as to drawing and colouring, (the elevation of the superciliary ridges not being marked, and the eyes represented as red,) it has been repeatedly copied by later Naturalists, as Foster, Shaw, &c. Bosc, who, from a long residence in Carolina, had a good opportunity of examining this animal, refers it to the Rana musica of Linnæus, in which he is followed by Daudin, Merrem, and most Naturalists. This cannot be correct, for there are no Toads, as far as has been hitherto ascertained, common to North and South America, and Linnæus, in the 12th edition of the Systema Naturæ, gives Surinam as the country of the R. musica. The name Rana musica, therefore, cannot be retained; but we must substitute that of Bufo clamosus, which was first given to this species by Schneider.





Engystoma Carolinense

10.

Sera pinx^t. *On Stone by G. Lehman.* *Lehman & Duval Lith^{rs} Philad^a*

ENGYSTOMA.—*Fitzinger.*

Genus Engystoma.—Characters. Body oval, covered with a smooth skin; head very small; mouth minute; jaws and palate without teeth; no post-tympanal gland; tympanum concealed; anterior extremities with four fingers; posterior short, with five toes, not palmated.

ENGYSTOMA CAROLINENSE.

Plate XI.

Characters. Body short, thick, nearly oval, covered with a delicate skin; chestnut above, and thickly mottled with blackish specks beneath; head and mouth larger than usual.

Description. The general form of this animal approaches the oval; the skin is smooth; the head remarkably small and short, though large for the genus; its extent is marked by a delicate fold of the integuments behind the orbits; its shape is triangular, the snout being very pointed; the upper jaw is dark brown, the lower dark gray; the mouth is inferior and minute. The eyes are very small, and but slightly prominent; the pupil is black, the iris very dark gray. The back is round, somewhat flattened in the living animal, and smooth; dark brown along the vertebral line, and chestnut on either side of it; the sides of the head and neck below the orbits, and the flanks, are grayish; the throat and abdomen lighter, all thickly sprinkled with blackish specks. The anterior extremities are chestnut-brown above and yellowish-brown beneath; the fingers are five in number, short, and distinct. The posterior extremities are short and thick, chestnut-brown above, with a few dark spots; the toes are five in number, short, and not palmated.

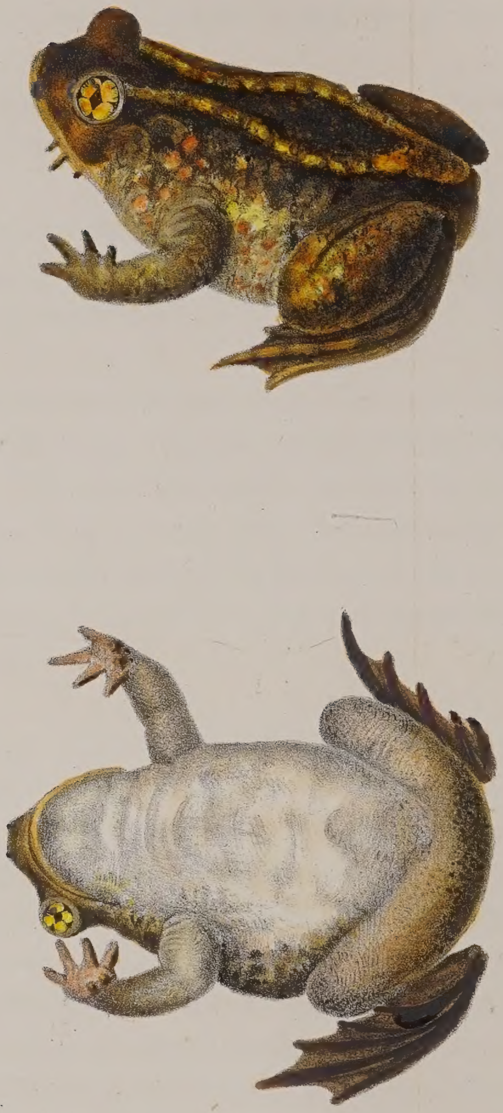
Dimensions. Length of body, 1 inch; of thighs, ⅜ of an inch; of leg, ⅜ of an inch; of tarsus and toes, ⅝ of an inch.

Geographical Distribution. Hitherto this animal has never been found north of Charleston; its range extending westward to the Lower Mississippi, where it has been observed by Le Sueur.

Habits. This animal passes most of its days in concealment, near old fences, or under the bark of fallen and decaying trees, emerging only towards evening and after heavy rains. They are frequently seen with myriads of the young of the Bufo clamosus, apparently washed from their places of concealment by summer showers. It makes a feeble chirp at night, and at times when captured; and being but a clumsy swimmer, if thrown into water it repeats this chirp frequently in its endeavours to escape.

General Remarks. This is the only species hitherto observed in the United States, and must not be confounded with those of South America. The E. Surinamense is nearly twice the size of our animal, is uniformly dusky on the back, and has a white line along the posterior surface of the thigh, and a white spot at the axils. Our species differs in the comparatively greater size of the head and mouth, as well as in the markings. It is possible that Bosc* referred to this animal when he says he observed in Carolina a "crapaud bossu, ou une grenouille" living under the bark of dead trees, though he describes its skin as so excessively delicate as to prevent his preserving it alive even for a short distance, in order to make a drawing of it. Now, though the skin of our animal is delicate, I have kept them alive for several months, and even sent them from Charleston to Philadelphia, where they not only arrived in safety, but lived a considerable time.

* Nouv. Dict. d'Hist. Nat., tom. vi. p. 489.



Scaphiopus solitarius.

12.

Sera pinx^{t}. On Stone by G. Lehman. Lehman & Duval Lith^{rs} Philad^{a}

SCAPHIOPUS.—*Holbrook.*

Genus Scaphiopus.—Characters. Body short, thick, swollen; head short; minute teeth in the upper jaw and on the palate; a small glandular wart behind the ear, from which a watery fluid can be pressed: posterior extremities short, stout, and muscular; leg shorter than the thigh; a spade-like horny process occupies the position of a sixth toe, and is used by the animal in excavating.

SCAPHIOPUS SOLITARIUS.

Plate XII.

Characters. Back olive coloured and somewhat warty, with two lines of pale yellow extending from the orbits to the vent; beneath yellowish-white.

Description. This singular animal approaches nearly to the toad in form. The head is short, the snout obtuse. The upper jaw is greenish-yellow, the lower yellowish-white. The nostrils are very near the extremity of the snout, and placed on a rounded prominence. The eyes are large and very prominent, almost resembling warts or excrescences; the pupil is black, the iris golden, very brilliant, and subdivided into four portions by two black lines. The tympanum is small, and yellowish-green; behind the tympanum is a small glandular wart, from which minute jets of watery fluid can be pressed.

The back is yellowish-green, clouded with dark brown blotches, and covered with small warts of different sizes; many of these are of a dark brown colour; others, reddish or orange. Two decurved lines of pale yellow extend from the orbits to the vent; on each flank is another line of the same colour, but less distinct and shorter, reaching only from the shoulder to the thigh. The inferior surface of the throat is yellowish white; the abdomen dirty white, and granulated posteriorly.

The anterior extremities are long; their colour yellowish-green, clouded with a few blotches of brown on the upper surface,—a reddish tinge on the lower, approaching to flesh colour. The fingers are four in number, short and distinct. The male is distinguished by having the two inner ones black above. The posterior extremities are short, but very muscular, and have the leg conspicuously shorter than the thigh; they are yellowish-green on the upper surface, marked with a few blotches and transverse bands of dark brown, and sometimes with a few small reddish spots. The lower surface of the thighs is flesh colour, and granulated. The toes are five in number, and distinctly palmated. On the internal margin of the metatarsus is a horny spade-like process, containing a bone, which moves by an imperfect joint: the breadth of this process is about a line and a half, its length one line; the cutting edge is jet black.

The skin is very delicate; and though warty after long exposure, when first taken from its hole the Scaphiopus presents the etiolated appearance of a genuine subterraneous animal.

Dimensions. Length of body, 2¼ inches; of the thigh, rather less than an inch; of the leg, ¾ of an inch; of the tarsus and toes, 1¼ inches; of the forearm, with carpus and fingers, nearly an inch.

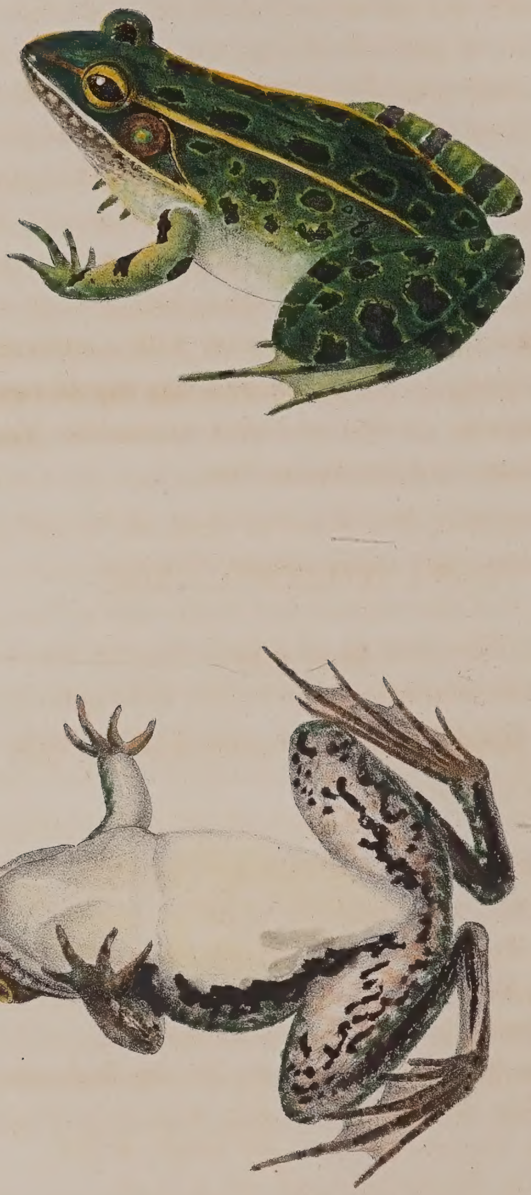
Geographical Distribution. Its range is more extended than I at first apprehended. It is found in Carolina and Georgia, and Dr. Troost has sent me a specimen from Tennessee.

Habits. This is a strange animal—an odd mixture of Toad and Frog, having the teeth of the one and the rudimental post-tympanal glands of the other; it approaches, however, nearest the Toad in its form and habits, as it never ventures in water except at the breeding season; it lives in small holes about six inches deep, excavated by itself in the earth, which for a long time I took for holes of insects: here it resides, like the Ant-Lion, seizing upon such unwary insects as may enter its dwelling. It never leaves its hole, except in the evening or after long continued rains. It shows great dexterity in making this dwelling; sometimes using the nates, and fastening itself by the spade-like process; at others it uses the legs with these processes, like a shovel, and will in this way conceal itself with great rapidity. In progression its motions are not very lively, and its powers of leaping but feebly developed. It appears early in March, after the first heavy rains of spring, and at once seeks its mate. I have met them even in very cold weather, with ice on the ground.

General Remarks. This animal is perhaps somewhat allied to the Ceratophris of South America, which has teeth, the posterior extremities short, and the hind feet furnished with a movable unarmed tubercle. The Rana cultripes of Cuvier* would seem to be furnished with a process more nearly resembling that of our animal.

---

* Cuvier, Regne Animale, vol. ii. p. 105.



Rana halecina.

15.

Sera pinx^t · *On Stone by G. Lehman* · *Lehman & Duval Lith^rs Philadelphia*

RANA.

Genus **Rana.**—**Characters.** Body covered with a smooth skin; upper jaw furnished with a row of minute teeth; another interrupted row in the middle of the palate: no post-tympanal glands; posterior extremities long, and in general fully palmated; fingers four; toes five in number.

RANA HALECINA.—*Kalm.*

Plate XIII.

Characters. Body green above, with ovate spots of dark brown, margined with yellow; yellowish-white beneath.

Synonymes. Rana aquatica; Water Frog, *Catesby*, Carolina, &c., vol. ii. tab. 70.
Rana halecina, *Kalm*, Iter. Amer., tom. iii. p. 46.
Shad Frog, *Bartram*, Travels in Carolina, Florida, &c., p. 278.
Rana pipiens, *Gmelin*, Ed. Syst. Nat., tom. iii. p. 1052.
Rana pipiens, *Bonnaterre*, Erpetologie, p. 5, tab. 4, fig. 3.
Rana halecina, *Daudin*, Rainettes, p. 63—Hist. Nat. des Rept., tom. viii. p. 122.
Rana pipiens, *Shaw*, Gen. Zool., vol. iii. p. 165.
Rana pipiens, *Merrem*, Versuch eines Syst. der Amph., p. 175.
Rana utricularia, *Harlan*, Silliman's Journal, vol. x. p. 60.
Rana halecina, *Harlan*, Jour. Acad. Nat. Scien., vol. v. p. 337.
Rana palustris, *Guerin*, Iconographie du Regne Animale—Reptiles, pl. 26; non *Leconte*.
Shad Frog, *Vulgo*.

Description. This is one of our most beautiful species. Its head is rather small and pointed, with an ovate black spot on the top of each orbit: a very bright bronze line* begins at the nose and runs to the eye; a second line of yellowish-white extends from the nose to the shoulder; the latter is less extensive in the male animal, ending at the vocal sac. The upper jaw is dark coloured, with several yellowish-white spots; the lower, almost white. The nostrils are lateral, and placed half way between the anterior part of the orbit and the snout. The eyes are large and prominent; the pupil is black, the iris of a brilliant golden colour, with a longitudinal black band passing through it. The tympanum is large, and finely bronzed, with a yellowish spot on its centre. In the male, the skin at the angles of the mouth is loose and folded, forming a vesicle on each side, when the animal utters its note.

The superior surface of the body is bright yellowish-green, marked with ovate spots of dark olive, margined with bright yellow: these spots are disposed in two rows on the back, and in two others less distinct and less extensive on the sides. From the posterior part of each orbit runs an elevated line or cuticular fold of a bright yellow, terminating near the posterior extremity of the body. The inferior surface is silvery-white at the throat, and yellowish-white on the abdomen.

The anterior extremities are bronzed green above, marked with several blotches of dark olive, one of which is very regularly found at the elbow; their inferior surface is whitish. The fingers are four in number, and distinct; the thumb of the male animal is furnished with a tubercle. The posterior extremities are very long, bright green above, marked with dark olive oblong blotches and transverse bars; the inferior surface is pale flesh colour and quite smooth, except at the posterior part of the thigh, where it is granulated. The toes are five in number, and well palmated; the fourth is of great length.

Dimensions. Length of body from the snout to the vent, 3 inches 2 lines; of the thigh, 1 inch 7 lines; of the leg, 1 inch 8 lines; of the tarsus and toes, 2 inches 2 lines.

---

* This line is yellow in the young animal.

Geographical Distribution. The Rana halecina is perhaps the most widely distributed of all the Frogs of the United States, and may be regarded as the representative of the common Frog (Rana esculenta) of Europe. I have observed it in all the Atlantic States, from the White Mountains of New Hampshire to Georgia: Leconte has seen it in the south-western States; Le Sueur on the Wabash, and Say even at the Lake of the Woods, in lat. 49°.

Habits. This is a lively, active animal, leaping the distance of eight or ten feet when disturbed; it feeds on insects, and is commonly found in damp places, or on the margins of pools of fresh water. Bosc says it is seldom seen far from water; but we have frequently met it in meadows and clover fields in search of insects, at a great distance from its accustomed haunts.

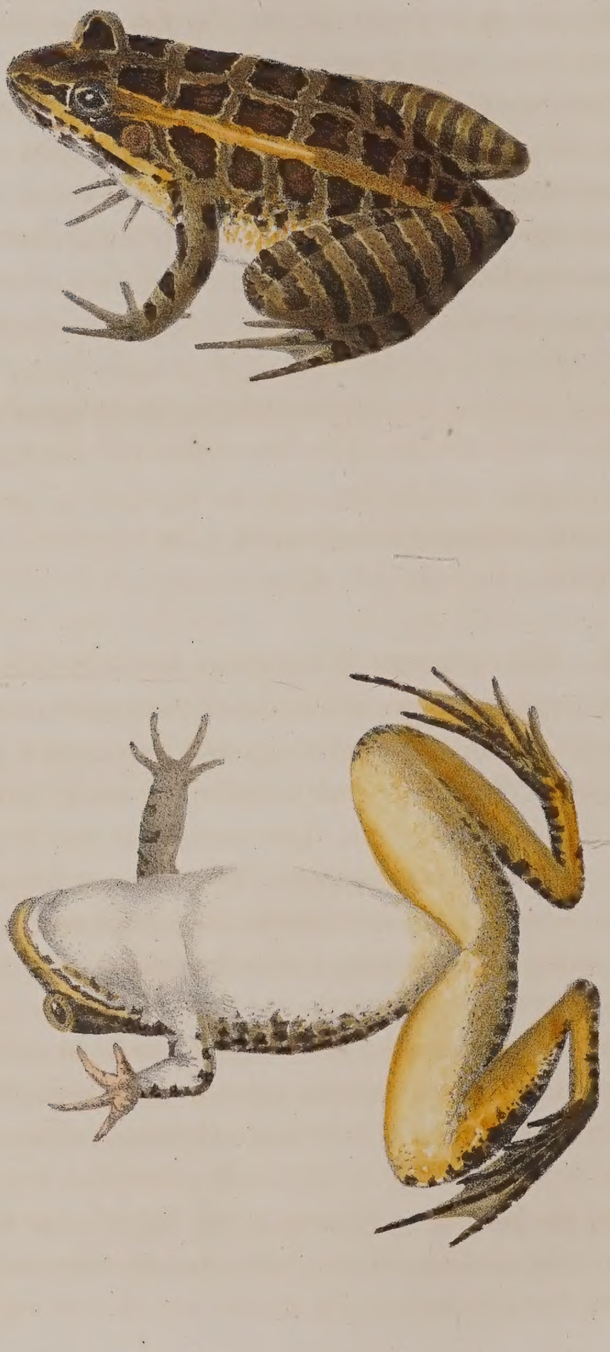
General Remarks. The history of this Frog is a good deal obscured by reference to very dissimilar animals in the works of Naturalists; yet by taking the earlier descriptions, it may be made clear. Catesby certainly first described the Rana halecina under the name Water Frog, and accompanied his description with a very good figure. The next mention made of this animal is by Kalm,* a Swedish traveller, an accurate observer, and excellent Naturalist, who called it the Shad Frog, and believed it to be identical with the Rana ocellata of Linnæus. He has described its habits, observing that it appears in Pennsylvania in the spring of the year with the Shad and Herring, and hence the Swedes who settled on the Delaware called it "Sill hoppetosser," or herring hopper; and in the Latin version† of his travels it is called R. halecina, "halec" being an Indian name for Shad or Herring. Linnæus‡ probably considered the R. halecina, from Kalm's description of it, as identical with his R. ocellata, to which it bears but a slight resemblance; both are certainly ocellated, but the spots are not disposed in the same manner; the R. ocellata is more than twice the size of the R. halecina, is peculiar to the West Indies and South America, and has never been found in the United States. Linnæus gave a still more remarkable reference to the R. maxima Americana aquatica of Catesby, which is certainly the Bull Frog, and entirely unlike the R. halecina. Gmelin, in his edition of the Systema Naturæ, gives the name R. pipiens to this Frog, but for what reason and on what authority we know not, as he refers at the same time to the original name halecina. Daudin separated this Frog, not only from the R. ocellata, but from all others, and described it under the name R. halecina, the original one given by Kalm.

---

* Kalm's Travels in North America, Forster's translation, vol. ii. p. 88.

† Iter Amer., tom. iii. p. 46, quoted by Daudin, Hist. Nat. des Rept., tom. viii. p. 112.

‡ Linnæus, Syst. Nat., vol. i. p. 356.



Rana Palustris.

14.

Sera pinx^{t} On Stone by G. Lehman Lehman & Duval Lith^{rs} Philad^{a}

RANA PALUSTRIS.—*Leconte.*

Plate XIV.

Characters. Body pale brown above, with two longitudinal rows of square spots of a dark brown colour on the back and on each flank; yellowish-white beneath; posterior half of the thighs bright yellow, mottled with black.

Synonymes. Rana palustris, *Leconte*, Ann. Lyc. N. Y., vol. i. p. 282.
Rana pardalis, *Harlan*, Silliman's Journal, vol. x. p. 50.
Pickerel Frog, *Vulgo.*

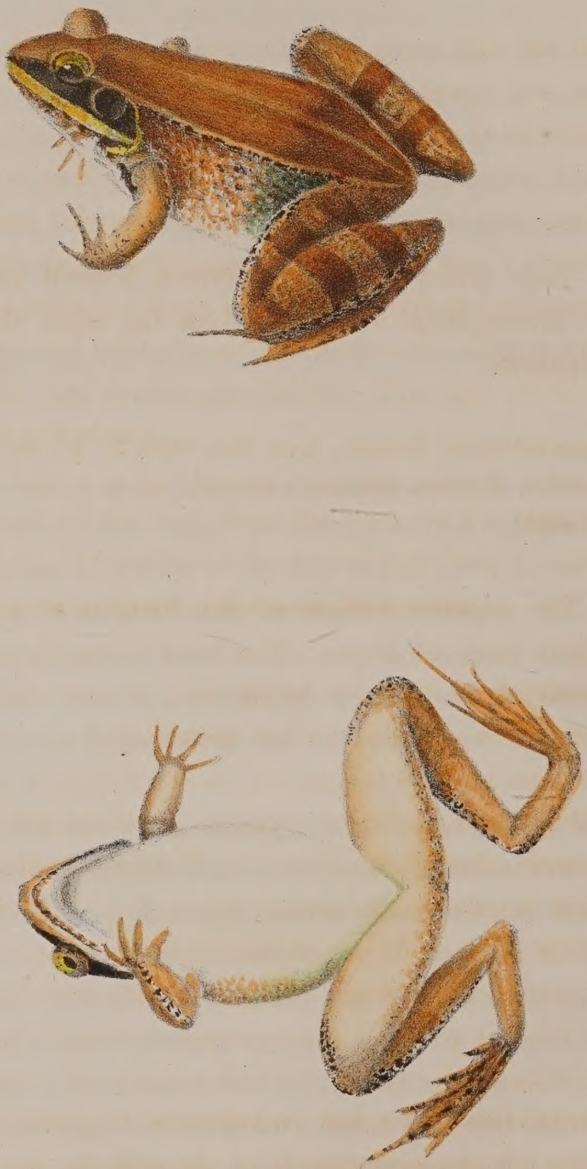
Description. The Rana palustris is a slender and delicately formed animal. The head is short and rather obtuse, with a dark brown spot on the top of each orbit, and another near the snout: an indistinct dark line extends from the nostrils to the orbit of the eye. The upper jaw is yellowish white, spotted with black; the lower white, spotted in like manner. The nostrils are nearly midway between the orbit and snout; a little nearest the latter. The eyes are large and prominent; the pupil black, with the iris of a golden colour: the tympanum is evident, though smaller than in the R. halecina; its colour is bronze, with a spot of a darker shade in the middle. A yellow line begins at the eye, and runs below the tympanum to the base of the anterior extremities. The superior surface of the body is pale brown, almost covered by oblong square spots of very dark brown, arranged symmetrically in two lines along the back: we sometimes find two of these squares confluent. A bright yellow, but not raised, longitudinal line begins behind each orbit, and extends to the posterior extremity of the body; below this line, on each flank, are two other rows of square brown spots, the superior row beginning on a level with and behind the tympanum; the inferior row is less regular, frequently consisting only of small spots, disposed without order. The inferior surface of the neck and abdomen is yellowish-white, except at the posterior part, where the yellow is more decided. The anterior extremities are short, yellowish-brown above, marked with a few very dark blotches; their lower surface is silvery white; the fingers are four in number, light brown on the upper, and yellow on the lower surface. The posterior extremities are very long, brownish above, with transverse bands of dark brown continued to the toes; the inferior and posterior parts of the thigh are granulated, and of a bright yellow, with black spots; the inferior surface of the leg and tarsus is yellow.

Dimensions. Length of the body and head, $2\frac{3}{4}$ inches; of the thigh, $1\frac{4}{10}$ inches; of the leg, $1\frac{1}{2}$ inches; of the tarsus and toes, $2\frac{2}{10}$ inches.

Geographical Distribution. This animal is found in the Atlantic States from Maine to Virginia, which State must be considered for the present its southern limit. Leconte has observed that it is the only one of our Frogs that frequents the neighbourhood of salt marshes, hence its name palustris. It is however by no means confined to such situations, being common throughout the middle and north-eastern States. I have observed it among the White Hills of New Hampshire, and in Massachusetts and Vermont, in the valley of the Connecticut.

Habits. The Rana palustris is very similar in its habits to the Rana halecina; it is generally found in the neighbourhood of ponds or rivers, yet I have often seen it in the morning after heavy dews, at a great distance from water.

General Remarks. Leconte first called the attention of Naturalists to this Frog, and established it as a distinct species, under the name of Rana palustris. It is singular that this very common animal should have been so long overlooked, and especially by so accurate a Naturalist as Kalm: it may have been confounded with R. halecina, but may be distinguished by the more obtuse head, the absence of cuticular folds on the back, the different form of the spots, and by its peculiar odour.



Rana Sylvatica.

15.

Sera pinxt On Stone by G. Lehman Lehman & Duval Lithrs Philada

RANA SYLVATICA.

Plate XV.

Characters. Body above pale reddish-brown, beneath yellowish-white; head with a very dark brown stripe, extending from the snout through the eye, and including the tympanum.

Synonymes. Rana sylvatica, *Leconte,* Lyc. Nat. Hist. N. Y., vol. i. p. 282.
Rana Pennsylvanica, *Harlan,* Silliman's Journal, vol. x. p. 60.
Wood Frog, *Vulgo.*

Description. The superior surface of this Frog is of a pale reddish-brown colour, with a slight tinge of green. The head is small, narrow and pointed. A very dark brown stripe, narrow before and broader behind, begins at the snout and extends to near the shoulder, including the nostrils, the pupil, the inferior half of the eye, and the tympanum: below this dark vitta is a yellowish-white line, extending to the shoulder: a black spot is usually present at the base of the anterior extremities. The upper jaw is bronzed, and mottled with dark brown; the lower is nearly white, having only a few black spots. The nostrils are placed nearer the point of the snout than in R. halecina. The eyes are large, the pupil is black, and oval in shape; the iris is very dark brown below, but the portion above the pupil is golden. The tympanum is small, and very dark brown.

The back is pale reddish-brown, with two elevated longitudinal yellow lines, often interrupted with black spots, extending from the orbit to the posterior extremity of the body. The flanks below these lines are mottled in front, greenish-white in the middle, and yellow near the thighs. The inferior surface is silvery-white at the throat and anterior part of the abdomen; yellowish-white on the posterior part, and yellow near the thighs.

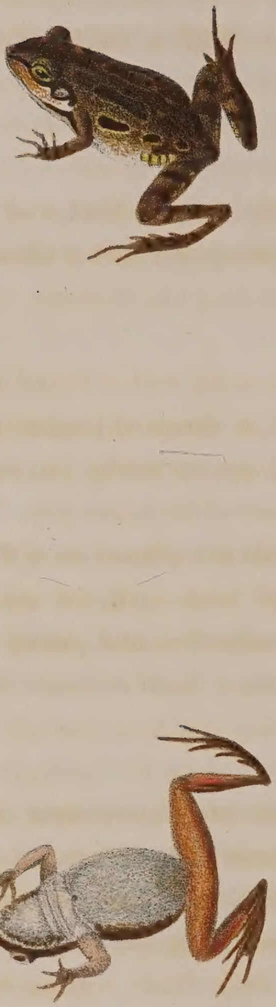
The anterior extremities are short, coloured above like the back, with a dark brown band running from the humerus towards the lower jaw, and another interrupted black line on its posterior border. The forearm is blotched and sometimes banded: the palms are more tuberculous than usual: there are four distinct fingers, flesh-coloured on their inferior surface. The posterior extremities are extremely long, coloured like the back, with regular transverse bands of darker brown continued to the feet; beneath, the thigh is flesh-coloured and granulated behind, white and smooth in front, and yellow near the abdomen. There are five toes, fully palmated, dark above and flesh-colour below. The tips of the fingers and toes are slightly enlarged and obtuse.

Dimensions. Length of the body from the snout to the vent, 1⅞ inches; of the thigh, 1 inch; of the leg, 1⅛ inches; of the tarsus and toes, 1⅝ inches; total length, from the snout to the extremities of the toes, 5⅝ inches.

Geographical Distribution. The Rana sylvatica is confined to the Atlantic States, and is found from New Hampshire to Virginia.

Habits. This Frog is found, though not abundantly, in the woods of the northern and middle States, choosing thick forests of oak. It is active, and when pursued, conceals itself among dried leaves, the colour of which it so nearly resembles as to be discovered with difficulty. In general it is found far from water, which it only approaches in the breeding season.

General Remarks. We cannot find any notice of this animal previous to the memoir of Leconte, where it is indicated under the very appropriate name of Rana sylvatica, but not fully described. Harlan nearly at the same time published a detailed and satisfactory account, in the tenth volume of Silliman's Journal.



RANA ORNATA.

Plate XVI.

Characters. Small; body rather short and thick, dove-colour above, with oblong spots of dark brown margined with yellow; toes not palmated, and the two outer ones united at base.

Description. The head is small, with a broad indistinct triangular spot between the orbits, the apex of which is directed backwards. A black line extends from the snout to the orbit of the eye, including the nostrils; below this black line is a yellowish blotch, covering most of the upper jaw. The lower jaw is cinereous above and white below. The nostrils are placed on a slight prominence. The eyes are large and projecting, the pupil very dark, the iris of a golden colour. The tympanum is small, very dark coloured, and placed in a dark vitta, which extends from behind the orbit to within a short distance of the shoulder. The teeth in the upper jaw are obvious.

The body is short, of a delicate dove-colour above, with two or more oblong spots of dark brown margined with yellow, on each side of the vertebral line; below these, and on each flank, are three smaller spots, likewise margined with bright yellow, the anterior one being the largest: these, with a smaller one above the vent, form a triangle on each flank: several bright yellow spots, also disposed in a triangular form, with the apexes directed forwards, are concealed by the thighs. The inferior surface of this animal is silvery-white, and except on the throat, every where granulated: about the throat are a few indistinct points of black; the anterior and middle parts of the abdomen are white, with a slight tinge; the posterior third approaches to flesh-colour.

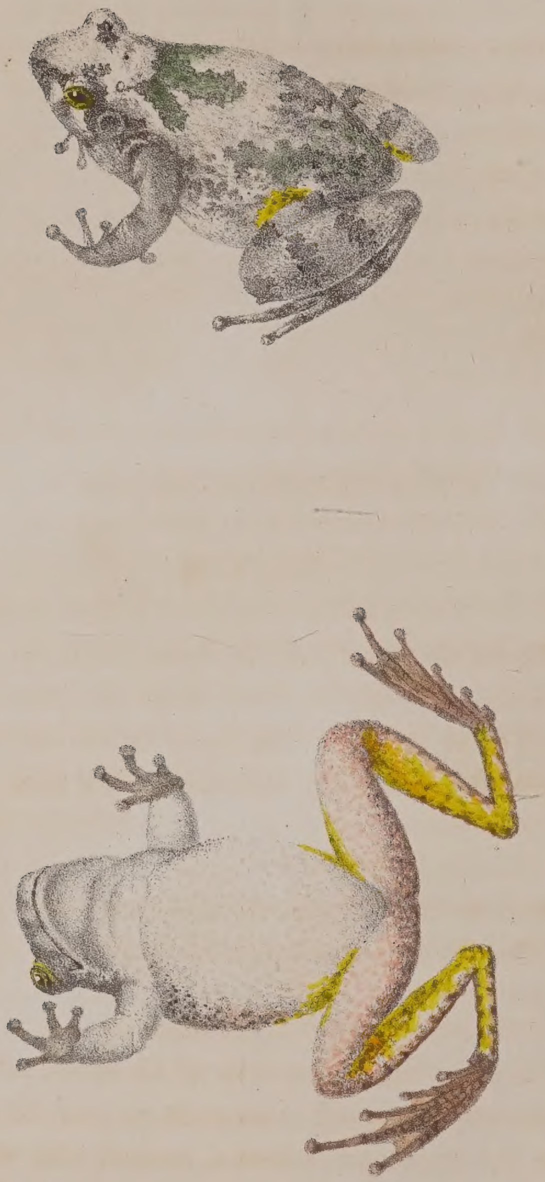
The anterior extremities are short, dove-coloured above, with a few distinct dark bands placed transversely on the forearm, and a black spot at the elbow; a black line runs from the inferior and upper part of the shoulder towards the lower jaw; the fingers are four in number, distinct, nearly equal, and the thumb seems less inclined to turn backwards than usual. The posterior extremities are also rather short, dove-coloured above, with transverse bands of dark brown: on the anterior part of the thigh are several small yellow spots; on the posterior surface these spots are so numerous and so closely approximated, as to resemble at first view a yellow waving line. The whole under surface of the thighs is flesh-coloured and granulated: the inferior surface of the legs flesh-coloured, with a few yellow dots: the toes are five in number, not palmated, and the two outer ones are united at base.

Dimensions. Length of body from the snout to the vent, 1¼ inches; of the thighs, ½ an inch; of the leg, ½ an inch; of the tarsus and toes, nearly ⅞ of an inch.

Geographical Distribution. This animal has hitherto been found only in South Carolina, and as yet only in one locality, about four miles from Charleston, between the Cooper and Ashley rivers, where it abounds.

Habits. Little can be said on the habits of this animal, which it seems resemble very much those of the Rana sylvatica. We have always found it on land, and in dry places; frequently in corn fields after light summer showers. It is very lively and active, making immense leaps when pursued, and consequently is taken with great difficulty. An individual thrown into water floated, struggling with its limbs extended, as though altogether unacquainted with the art of swimming. I have never heard it produce any sound.

General Remarks. The great beauty of this little animal, the number and variety of its spots and bars, leads me to give it the specific name of ornata. It is remarkable for having its hinder feet not palmated, the toes being very nearly, if not altogether, destitute of a connecting web; in which respect it agrees with several South American species, forming the genus *Cystignathus* of Wagler; which name, however, is not entirely appropriate, for the male of the Rana halecina has a vocal vesicle at each angle of the mouth, though agreeing in every respect with the true Frogs:—whether the same peculiarity exists in the Rana ornata, I have not yet been able to determine.



Hyla Versicolor.

17.

Sera pinx^{t}. On Stone by G. Lehman Lehman & Duval, Lith^{rs} Philad^{a}

H Y L A.—*Laurenti.*

Genus **Hyla.**—**Characters.** Body in general elongated; upper jaw and palate furnished with teeth; tympanum apparent; no post-tympanal glands; fingers long, and with the toes, terminating in rounded viscous pellets.

HYLA VERSICOLOR.—*Leconte.*

Plate XVII.

Characters. Resembling the Toad in form, but more flattened; body short, and warty above: colour varying at times from the palest ash to dark brown, marked with several large irregular blotches of brown and frequently tinged with green; white and granulated beneath: abdomen yellow near the thigh: leg shorter than the thigh.

Synonymes. Hyla versicolor, *Leconte,* Lyc. Nat. Hist. N. Y., vol. i. p. 281.
Hyla versicolor, *Harlan,* Jour. Acad. Nat. Scien., vol. v. p. 343.
Tree Toad, *Vulgo.*

Description. This is a beautiful species of Hyla; its colours seeming to vary at the will of the animal. The head is short, broad and obtuse, with a dark brown spot on each orbit: the upper jaw is brown, marked with white spots; the lower, entirely white: the nostrils are in front and near together: the eyes are large and brilliant; the pupil black, the iris of a bright golden-yellow: the tympanum is brown, surrounded by a circle of a lighter shade. The throat of the male becomes inflated while uttering its note.

The superior surface of the body is covered with minute warts and granulations, an unusual character in this genus: its colour is changeable, passing in a short time through every intervening shade from dark brown to the palest ash-colour, becoming in some parts perfectly white: it is marked with large irregular blotches of dark brown; and we often find between the shoulders one of these blotches cruciform; they disappear however, almost entirely when the animal assumes its lightest tint. The inferior surface of the body is white, with large granulations; a small portion of the sides and posterior part of the abdomen is bright yellow.

The anterior extremities are ash-coloured above, with a few small blotches of brown; the fingers are four in number, cleft, and terminating in rounded pellets, by means of which the animal adheres to smooth surfaces. The posterior extremities are moderately long, and ash-coloured above, with a few transverse bars of dark brown, continued even to the toes: the under surface of the thighs is granulated and yellow near the abdomen, white in the middle, and yellow near the legs; the inferior surface of the leg is yellow, and of the foot brown: the toes are five in number, palmated, and terminating in pellets like the fingers. The skin above these pellets presents quite obviously the appearance of the "human nail," spoken of by Linnæus in other species.

Dimensions. Length of the body from the snout to the vent, 2 inches; of the thigh, nearly an inch; of the leg, $\frac{9}{10}$ of an inch; of the tarsus and toes, $1\frac{2}{5}$ inches.

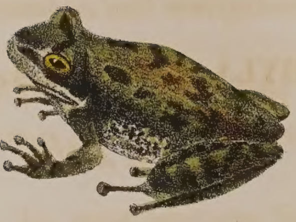
Geographical Distribution. The Hyla versicolor is found abundantly in all the northern and middle States, as far as lower Virginia, which State must for the present be considered its limit on the south. I cannot determine its geographical distribution west of the Alleghanies; it seems however widely extended:—Mr. Le Sueur has observed it on the Wabash, and Professor Troost furnished me with several fine specimens from the banks of the Cumberland river.

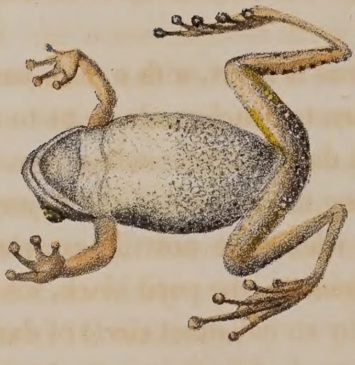
Habits. This animal is commonly found on trees and about old stone fences, overgrown with mosses and lichens, the colour of which it so closely resembles that it frequently escapes observation, even when sought for. It very commonly chooses old and decaying Plum trees for its abode, probably because the insects on which it feeds are most abundant in such situations. It is very noisy towards evening, in cloudy weather, or before rain, its voice consisting of a liquid note, terminating abruptly, like l-l-l-l-l-l-luk. At the close of spring, and during great part of the summer, when the Toad has become silent, this note may be heard, especially in the evening, from various shallow pools, to which the animal resorts for the purpose of depositing its spawn. Harlan* mentions an instance of one being dug up at the root of an apple tree, during the winter season, several feet beneath the surface of the ground.

General Remarks. The verrucose body of this Hyla and its rounded shape, give it the appearance of a Toad; the skin also is moist and viscid, exuding an acrid fluid, which has led many persons to believe it poisonous; and certainly the secretion afforded by the glands of the cutaneous organs is more acrid than that given off by any other Toad or Frog which we have seen in a living state.

It is remarkable that an animal so common and so very noisy should have so long escaped the attention of Naturalists. The first mention made of it is in Kalm's Travels in North America: he however only describes its habits, and refers to the R. arborea of Linnæus, to which it bears but a slight resemblance. Leconte was certainly the first who minutely and accurately described it, and established its claim to be considered as a new and distinct species.

* Medical and Physical Researches, p. 109.





Hyla squirella

18.

Sera pinx^t

On Stone by G. Lehman.

Lehman & Duval Lith^rs Philadelphia.

HYLA SQUIRELLA.—*Bosc.*

Plate XVIII.

Characters. Body olive-green above, marked with dark brown blotches irregularly disposed; a transverse dusky band between the orbits; whitish beneath and granulated: head short, with a white line extending along the upper lip to the shoulder.

Synonymes. Hyla squirella, *Bosc,* Nouv. Dict. d'Hist. Nat., tom. xxix. p. 543.
Hyla squirella, *Daudin,* Rainettes, p. 18, t. 3, f. 1—Hist. Nat. des Rept., tom. viii. p. 35.
Calamita squirella, *Merrem,* Versuch eines Syst. der Amph., p. 171.
Hyla squirella, *Leconte,* Ann. Lyc. N. Y., vol. i. p. 279.
Hyla squirella, *Harlan,* Jour. Acad. Nat. Scien., vol. v. p. 342.
Auletris squirella, *Wagler,* Natürliches Syst. der Amph., p. 201.

Description. The head is short, with a dark band between the orbits, the line from each orbit being directed backwards so as to meet at an angle: the snout is obtuse, with an indistinct dark band extending from the nostrils to the eyes, below which is a white line along the margin of the upper lip, reaching to the shoulder; the lower jaw is almost white: the nostrils are placed near the extremity of the snout: the eyes are prominent; the pupil black, the iris golden: the tympanum is bronzed and surrounded by an indistinct circle of dark brown. The skin is smooth: the body short and depressed while living; the back is olive-green, with irregular blotches of darker olive; the flanks are gray. The inferior surface of the body is granulated, greenish-white in front, with a few dark spots at the throat; the posterior part of the abdomen is darker. The anterior extremities are olive-green above with occasional spots of brown, and flesh-coloured beneath; the fingers are four in number, distinct, and each terminating in a viscous pellet. The posterior extremities are long, green above obscurely blended with dark brown, and flesh-coloured beneath, tinged with yellow externally; the lower surface of the thigh is granulated; the toes are five in number, and semipalmated.

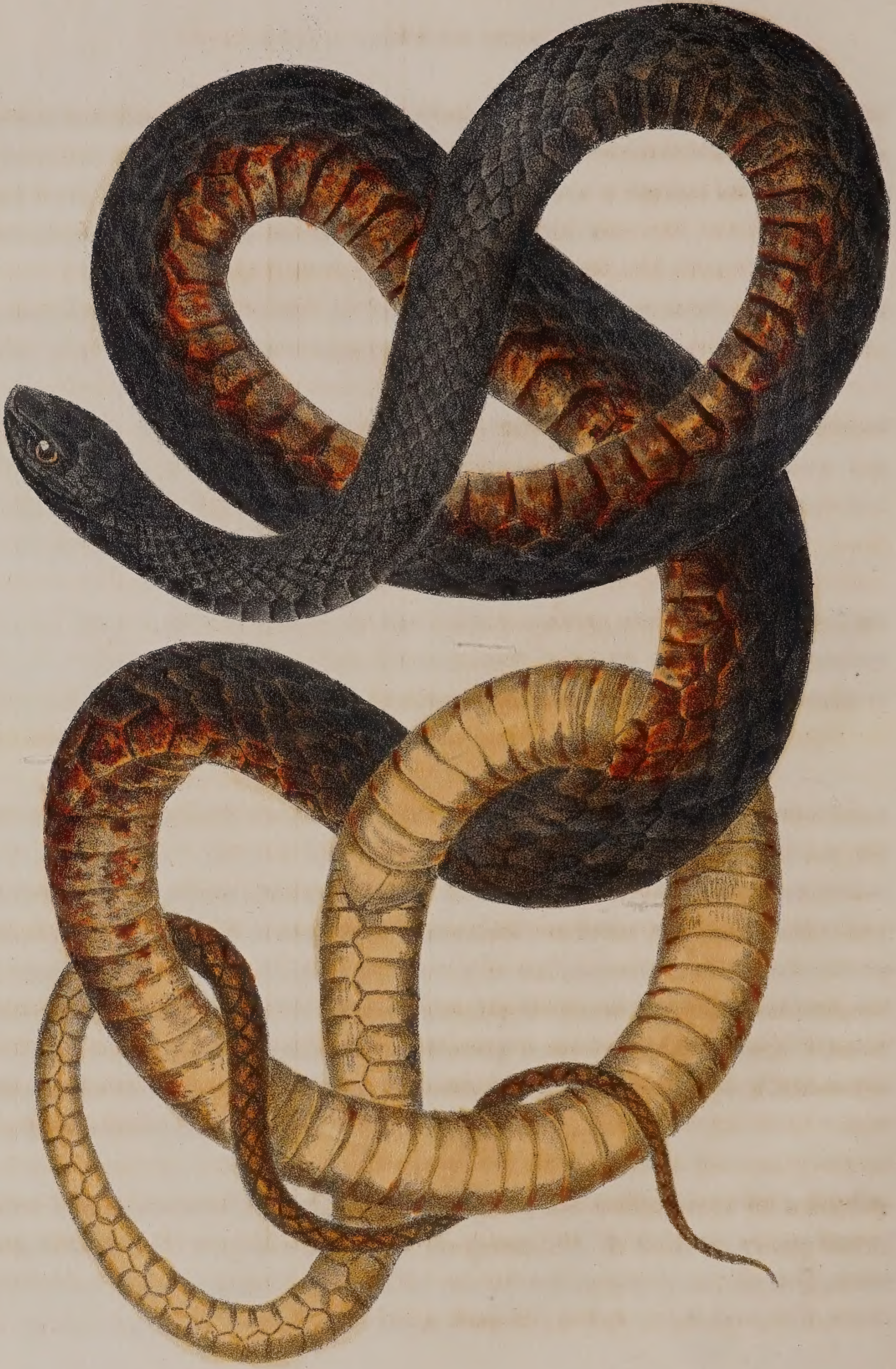
DIMENSIONS. Length of body and head, 1¼ inches; of the thigh, ⅘ of an inch; of the leg, ⅘ of an inch; of the tarsus and toes, $\frac{9}{10}$ of an inch.

GEOGRAPHICAL DISTRIBUTION. Its most northern limit must be considered as lat. 34°;—we have no evidence of its being found farther north. It abounds in South Carolina, Georgia, and Florida;—how far west of these States it may exist cannot at present be determined.

HABITS. This animal is found on trees, often seeking shelter under the bark of such as are decaying; it frequently chooses old logs for its place of hybernation. In fine weather and after showers, it climbs even the highest trees in search of insects.

GENERAL REMARKS. The colours of this animal are even more changeable than in any species with which I am acquainted—I have seen it pass in a few moments from a light green, unspotted and as intense as that of Hyla lateralis, to ash colour, and to a dull brown with darker spots: the spots also at times taking on different tints from the general surface. The markings, too, vary exceedingly in different individuals, the white line on the upper lip and the band between the orbits alone presenting some constancy. Daudin remarks that the leg is "shorter than the thigh;" we have found them nearly equal in length, and this character is by no means so conspicuous as in H. versicolor.

Daudin first described this animal and gave a figure of it, from a drawing furnished him by Bosc. Leconte has given the latest and most detailed account of it, establishing three principal varieties, in one of which the spots, as well as the yellow on the thighs, disappear altogether.



Coluber flagelliformis.

19.

Sera pinx^t *On Stone by G. Lehman* *Lehman & Duval Lith^rs Phila.*

COLUBER FLAGELLIFORMIS.

Plate XIX.

Characters. Head elongated; supra-orbital plate projecting over the eye: body very long and slender; the anterior part intense black, both above and below; the middle mixed brown and white, the posterior part and tail whitish or chocolate-colour. Tail one-fourth of total length. Pl. 203—Sc. 109.

Synonymes. Anguis flagelliformis, Coach-whip Snake, *Catesby,* Carolina, &c. vol. ii. tab. 54.
Coach-whip snake, *Bartram,* Travels in Carolina and Florida, p. 219.
Coluber flagellum, *Shaw,* Gen. Zool., vol. iii. p. 475.
Coach-whip snake, *Vulgo.*

Description. The head is elongated and narrow, the upper jaw projecting: the vertical plate is pentagonal, larger in front, long and narrow, presenting an acute angle backwards; the occipital plates are triangular, large, covering nearly the whole of the posterior part of the head; the supra-orbital is very large, somewhat quadrilateral, and projecting greatly over the eye; the posterior orbital are two in number, the superior one extending upwards on the supra-orbital projection; and immediately behind these are several scales taking the place of a temporal plate; the anterior orbital are two in number, the lower very small, the upper one likewise expanding on the supra-orbital projection; the loral is short and wide; the frontal plates are quadrilateral; the nasal nearly of the same form; the rostral plate is very small, triangular, and rounded in front. The nostrils are lateral, large, placed at the junction of two plates, and very near the snout: the eyes are very large, but appear sunken in consequence of the projection of the supra-orbital plate; the pupil is black, the iris dark gray.

The neck is small, the body very long: the tail is long, attenuated like a whip-lash, which it further resembles in the braided appearance produced by the large scales and their dusky margins. The scales are all destitute of a carina, and in general have two points at the apex; those on the upper part of the neck are quite small; on the fore part of the body they are rhomboidal, narrow and elongated; and on the tail and lower part of the body they are short and broad, somewhat hexagonal. Abdominal plates, in the specimen figured, 203, and 109 pairs of subcaudal scales.

Colour. The superior surface of the head and neck, and nearly one-third of the body, is glossy raven-black, gradually becoming paler on approaching the tail, which is of a very light brown or chocolate-colour; the scales on the tail are rendered conspicuous by their dark margins. The inferior surface of the neck and anterior part of the abdomen is bluish slate-colour; the posterior part white, clouded with brown; some parts of the abdomen are white and shining, as well as the inferior surface of the tail. This Snake varies however in colour, or rather in shade; Bartram has seen them of a cream-colour, clay-coloured, and sometimes almost white, but always raven-black near the head.

Dimensions. Length of the head, to the small scales, 1¼ inches; of the head and body, 45 inches; of the tail, 16 inches; circumference, 2¼ inches; total length, 5 feet 1 inch. This is the measurement of the specimen from which the accompanying plate was taken; it is said they sometimes reach the length of seven feet.

Geographical Distribution. The Coach-whip Snake is found in South Carolina, Georgia, and Florida, but is rare. During a seven years' search I have never seen but one living specimen, which was sent me by Mr. Hay, of Abbeville District, South Carolina.

Habits. This beautiful animal is remarkable for the swiftness of its motions, "seeming almost to fly over the surface of the ground."* It feeds on young birds, but only destroys for food. It is inoffensive in its manners, but defends itself with great dexterity when attacked, by twining its long body round the enemy. Bartram gives the following account of it:—"I observed a large Hawk on the ground in the middle of the road; when coming up near him, I found him bound up by a very long Coach-whip Snake, that had wreathed itself several times round the Hawk's body, who had but one of his wings at liberty. Beholding their struggles awhile, I alighted off my horse with the intention of parting them; when, on coming up, they mutually agreed to separate, each seeking his own safety, probably considering me as their common enemy."

---

* Bartram, Travels in Carolina, &c., p. 219.

General Remarks. Of all the species found east of the Mississippi, the Black Snake (Coluber constrictor) is the only one hitherto known that can be compared with the Coach-whip, in the scales, the disposition of the plates on the head, and in its general form and habits.

There is great confusion in the works of European Naturalists with regard to this Snake. Catesby first made it known under the name "Coach-whip Snake," and gave an excellent figure of it—one of the best in his work: yet it has been confounded with the Chicken Snake, the Black Snake, the Green Snake, and by some Herpetologists has been overlooked altogether.

Linnæus describes a Coluber filiformis,* which some Naturalists have considered as the Coach-whip Snake, but it agrees with the latter neither in colour, the number of its plates, nor in its geographical distribution. Laurenti next gave a Natrix flagelliformis:† this cannot be our Snake, for he refers to tab. 47 of Catesby, which is the Dryinus mycterizans, and is not found in the United States. Daudin, under his Coluber flagelliformis,‡ adds still more to the confusion; he refers to the mycterizans, and to tab. 57 of Catesby, certainly the Green Snake, which he says is "called by the Anglo-Americans Coach-whip Snake;"—his description, then, of the Coach-whip is taken from the Green Snake! During all this time the plate and description of Catesby were overlooked, till Shaw called the attention of Naturalists to them, and copied them in his General Zoology. Merrem* gives a Coluber flagelliformis, but refers to the filiformis of Linnæus and the Natrix filiformis of Laurenti, as synonymes; here we find a second reference to Catesby's animal, but it is given doubtingly.

---

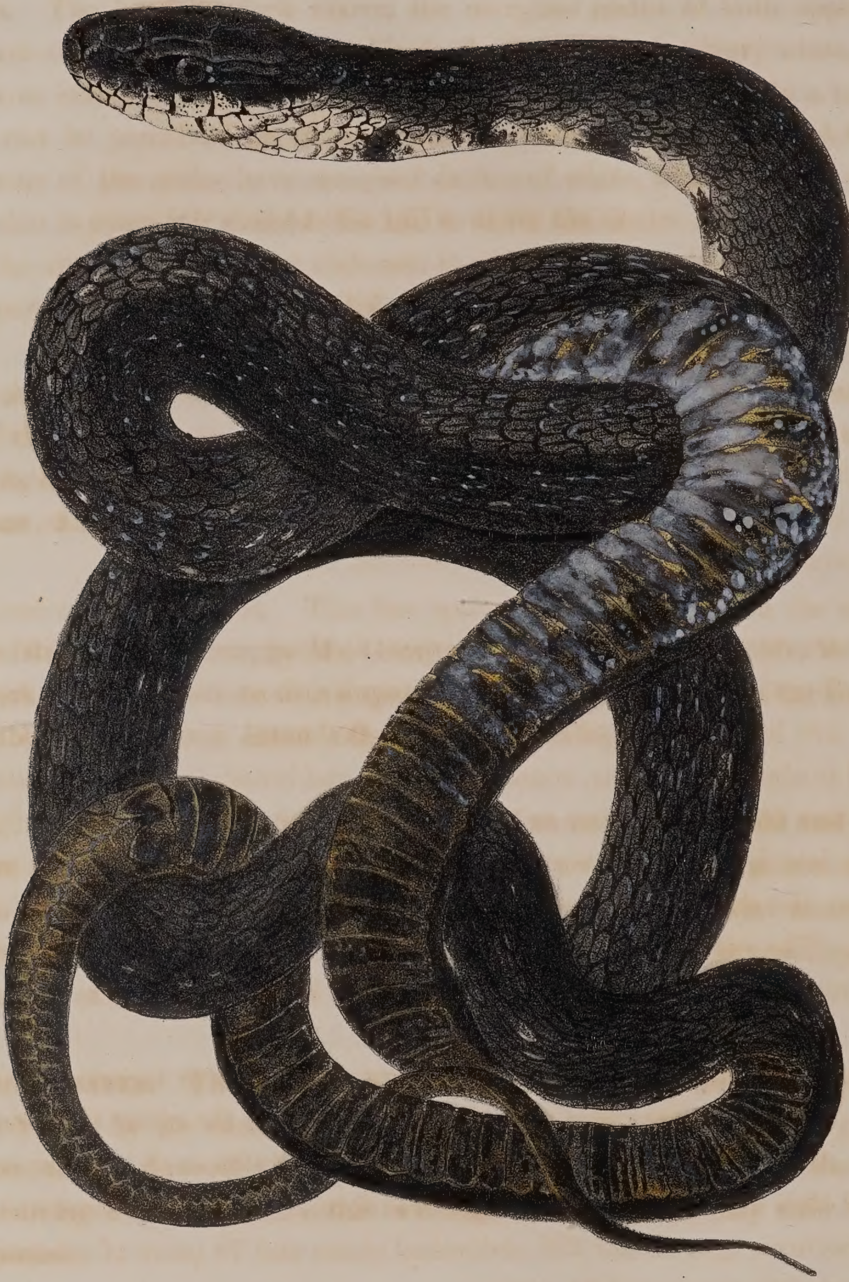
* Syst. Nat., vol. i. p. 383.

† Synop. Rept., p. 79.

‡ Hist. Nat. des Rept., vol. vi. p. 380.

It seems then that the Coluber flagelliformis has not been described, or even referred to properly, by any systematic writer on natural history, except Shaw; and even his name must yield in priority to that of Catesby.

* Versuch eines Syst. der Amph., p. 116.



Coluber Alleghaniensis.

20.

Sera pinx.^t *On Stone by G. Lehman* *Lehman & Duval Lith^rs Philad^a*

COLUBER ALLEGHANIENSIS.

Plate XX.

Characters. Above shining black: beneath, white on the throat, becoming clouded with brown on the anterior part of the abdomen, and entirely slate-colour towards and beneath the tail. Head elongated, rather large, distinct from the neck; body very long; scales on the back carinated, on the flanks smooth: tail one-seventh of total length. Pl. 235–40, sc. 78–84.

Description. The head of this Serpent is elongated and large; and the mouth is also large. The vertical plate is pentangular, short and broad; the supra-orbital plates are large; the frontal, also large; the nasal, somewhat trapezoidal; the rostral is above triangular, rounded in front and broad; the temporal are variable, sometimes consisting of two or three narrow plates, or their place chiefly occupied by the last labial plates, very much enlarged; the posterior orbital are two in number; the anterior orbital, single, and very large; the loral is small, and tapezoidal. The nostrils are lateral, and placed at the junction of two large plates. The eyes are rather large, the pupil black, the iris brown.

The neck is small; the body much elongated, fusiform or tapering at each extremity. The scales are oblong-oval and bipunctate at the apex: those on the back have a distinct carina; the four or five inferior rows on each side are smooth; on the tail they are broader and hexagonal in form. The tail is short and tapering. The specimen figured had 235 abdominal plates and 78 pairs of subcaudal scales; a second, 240 plates and 84 scales.

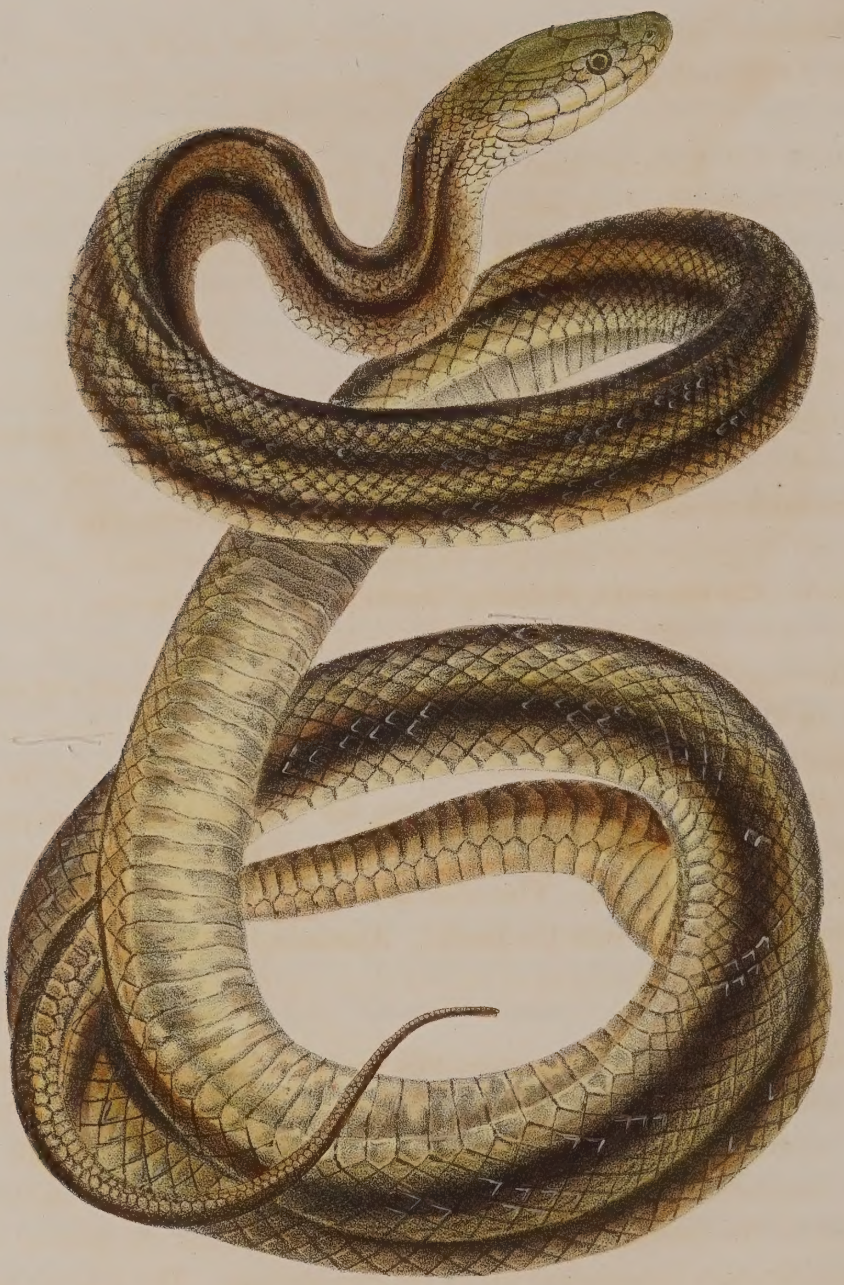
Colours. The head is black above; the marginal plates of both upper and under lip are silvery white, edged with black; the throat also is silvery white. The body is above intense black, glistening or polished; but in a certain light a mixture of brown can be perceived on close inspection, without however any definable pattern: many of the scales have marginal dashes of white, which become visible when the skin is extended; towards the tail however the scales are entirely black. Beneath, the anterior part of the abdomen is white, clouded with brown, and the posterior part and tail entirely slate-colour.

Dimensions. Length of the head, to the commencement of the small scales, 1¼ inches; of the mouth, from the angle to the centre of the lower lip, 1¾ inches; total length, 5 feet 3 inches; tail 9 inches. Circumference of the body in the thickest part, 4 inches.

Geographical Distribution. This fine specimen was captured on the summit of the Blue Ridge in Virginia, by Mr. George Robbins of this city. Mr. Wilkens, of New York, also favoured me with a specimen from the Highlands of the Hudson. It is probable that its range extends throughout the Alleghanies.

Habits. The animal in confinement seemed of an exceedingly mild and gentle disposition; forming in this respect quite a contrast with its fellow prisoners, two individuals of the common Black Snake, (Coluber constrictor,) who maintained at all times their original wildness. It lived several months, and is now deposited in the Museum of the Academy of Natural Sciences.

General Remarks. The Coluber Alleghaniensis is readily distinguished from the Black Snake by its carinated scales; still the two species bear a general resemblance, and might readily be confounded. Perhaps the accounts of the Black Snake occurring of unusual size, that we sometimes hear of, may refer to the present species.



Coluber 4-vittatus .

21.

Sera pinx^{t} On Stone by G. Lehman. Lehman & Duval Lith^{rs} Phila.

COLUBER QUADRIVITTATUS.

Plate XXI.

Characters. Body very long, above greenish clay-colour, with four longitudinal brown bands; beneath yellowish: head distinct; scales on the back carinated, on the flanks smooth; tail one-fifth of total length. Pl. 233—Sc. 90.

Synonyme. Chicken snake, *Bartram*, Travels in Florida, &c., p. 275.

Description. The plates on the head and the scales throughout are entirely the same as in C. Alleghaniensis; except that perhaps the nasal plates are a little larger, and the carina of the dorsal scales less obvious: The size of the eye and position of the nostrils are also the same; but the tail is longer in proportion. There are about sixteen rows of carinated scales on the back, and about three on each side that are smooth. The abdomen during life, often presents a plane surface, at right angles with the flanks. Abdominal plates 233, and 90 pairs of subcaudal scales.

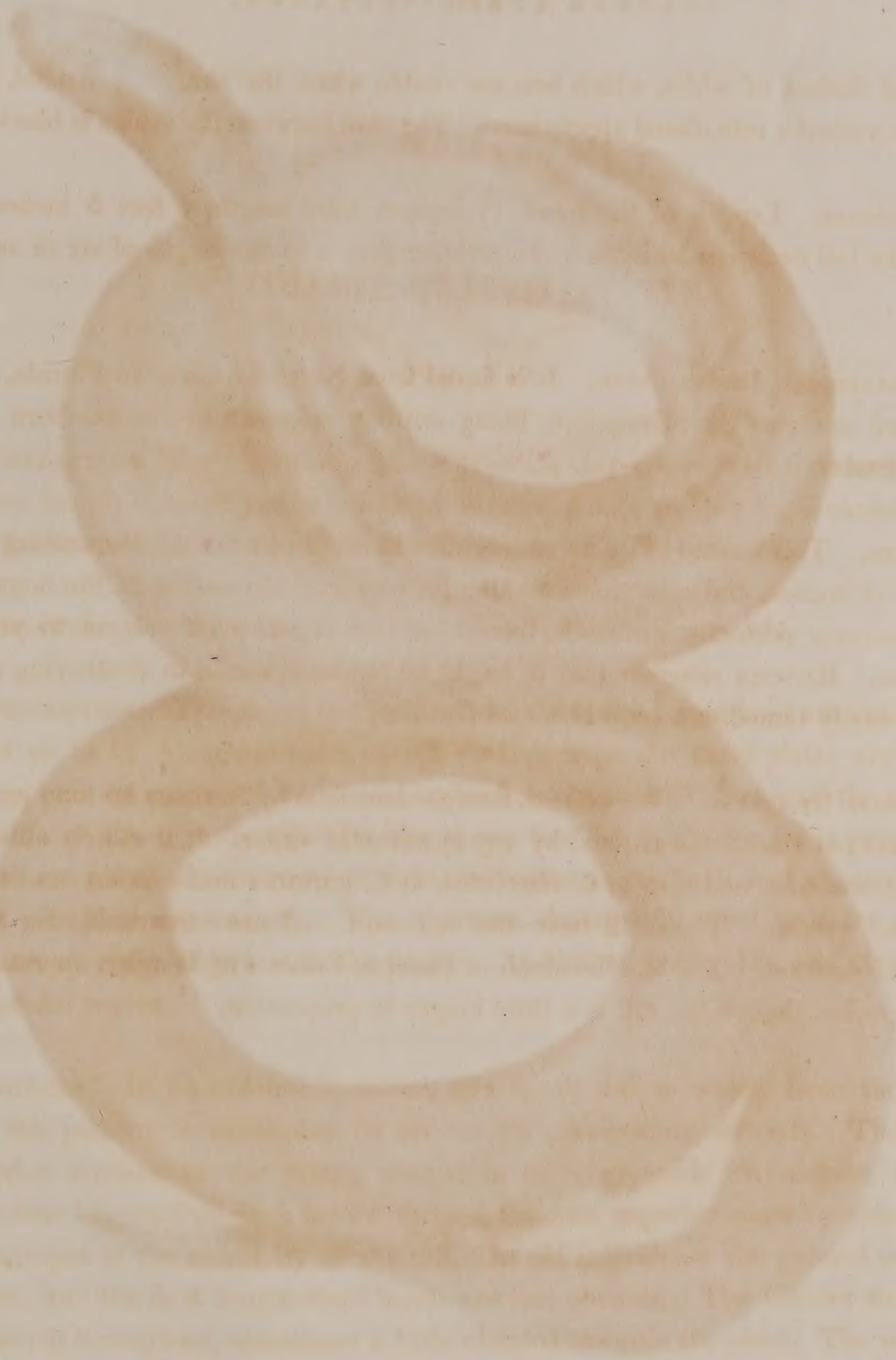
Colours. In its colours however, this snake differs widely from the other, and the pattern is invariable so far as my observation extends. The whole superior surface in the young animal is of a greenish clay-colour, marked with four longitudinal dark brown stripes, the two superior ones reaching from the occiput to the extremity of the tail. In old individuals the general colour is brown, and the dark longitudinal bands are less obvious. The inferior surface is yellowish throughout, sometimes a little clouded towards the sides. The scales of the back and sides are frequently sprinkled with minute blackish dots, and many have marginal dashes of white, which become visible when the skin is extended, and give the animal a reticulated appearance. The skin between the scales is blackish.

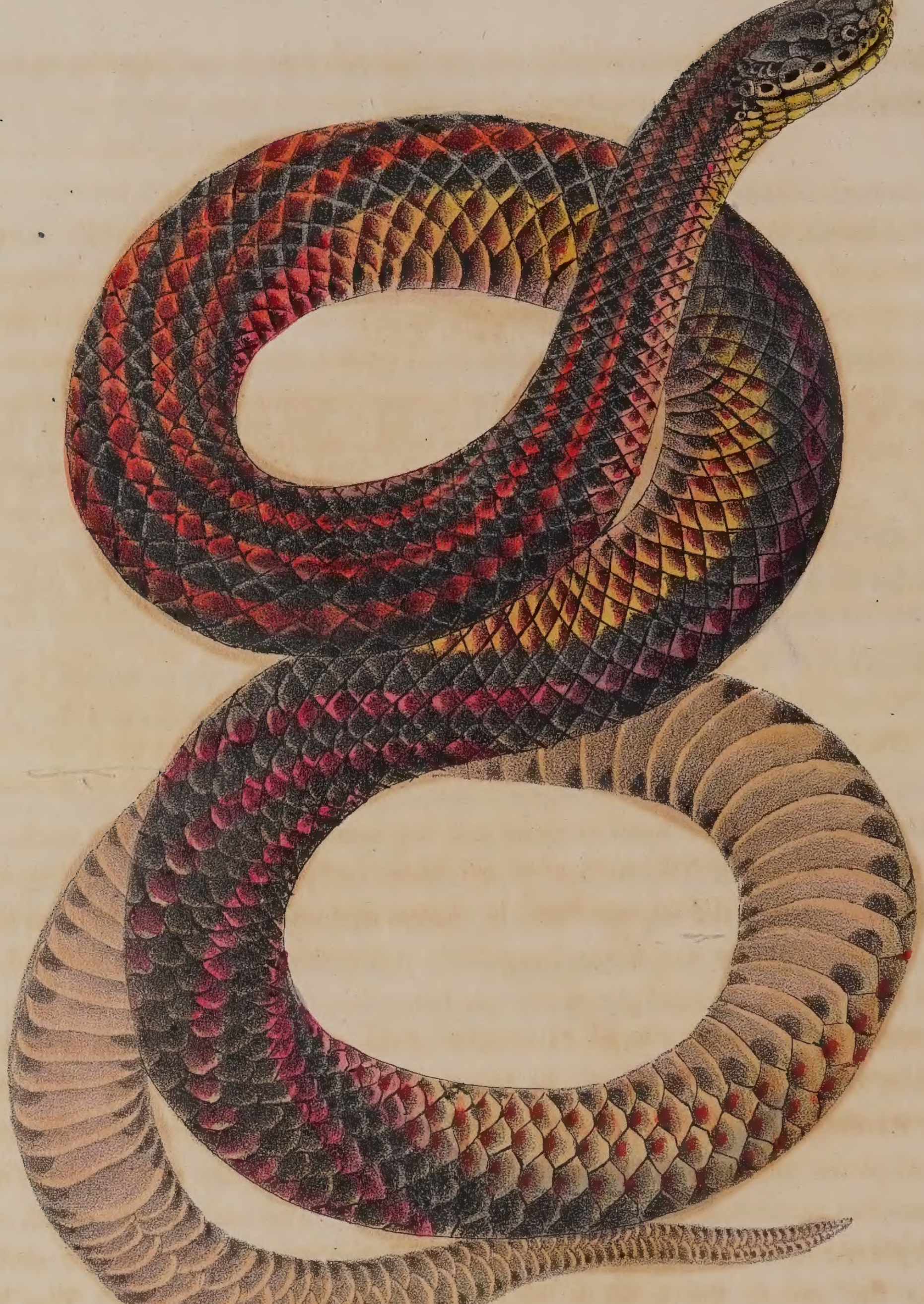
Dimensions. Length of the head, 1⅛ inches: total length, 4 feet 5 inches, of which the tail occupies 10 inches. It however grows to the length of six or seven feet.

Geographical Distribution. It is found from North Carolina to Florida, and westward as far as the Mississippi: being entirely unknown in the northern and middle States.

Habits. This animal is by no means rare in South Carolina; frequenting the vicinity of houses, and sometimes making its way into the cabins of the negroes. It is however perfectly innoxious, though in bad repute with respect to young chickens. Bartram suggests that it might be rendered useful in destroying rats, as it is easily tamed and soon becomes familiar.

General Remarks. This animal, though described by Bartram so long ago as 1791, has not since been noticed by any systematic writer. It is closely allied to C. Alleghaniensis, and also to C. obsoletus, to C. guttatus and eximius, and to C. Sayi and getulus. These all have the tail short, and are remarkable for their gentle disposition. The C. Æsculapii of Europe, *Zamenis* of Wagler, approaches these species, though the tail is a little longer in proportion.





Coluber crythrogrammus.

22

Sera pinx^{t} *On Stone by G. Lehman* *Lehman & Duval Lith^{rs} Phila.*

COLUBER ERYTHROGRAMMUS.—*Daudin.*

Plate XXII.

Characters. Head short, depressed, small, and not distinct from the neck; nostrils superior, and placed near the snout; eyes small, directed upwards; body stout: superior surface bluish-black, with three longitudinal red lines, and a row of bluish-black spots on each side of the abdomen: tail rather longer and more slender than in the following species, one-eighth of total length. Pl. 178—Sc. 39.

Synonymes. Coluber erythrogrammus, *Daudin,* Rept., vol. vii. p. 93, tab. 83, f. 2.
Natrix erythrogrammus, *Merrem,* Versuch eines Syst. der Amph., p. 117.
Helicops erythrogrammus, *Wagler,* Natur. Syst. der Amph., p. 170.

Description. The head is short and depressed, smaller than the neck; and the mouth is also small. The vertical plate is short and pentangular, presenting an acute angle backwards; the supra-orbital is narrow and almost a parallelogram in shape; the occipital plates are large, irregularly triangular, the basis directed forwards and rounded; the frontal plates are quadrangular, transverse, with the inferior and posterior angle forming part of the orbit of the eye; there are two posterior orbital plates, the upper one large, the lower very small; the anterior orbital plates are wanting, but the loral supplies their place, and is narrow and elongated; the nasal plates are two in number, small and trapezoidal; the nostril plates are also somewhat trapezoidal; the rostral is very broad. The nostrils are small, superior and placed near the snout. The eyes are very small, also superior and placed near the snout; the pupil is black, and the iris grayish-red. The body is somewhat depressed, elongated and fusiform, tapering at the head and tail. The scales are all smooth and shining, broad, obtuse, and somewhat hexagonal on the back, and nearly uniform in size throughout, the inferior row being a little larger. The tail is longer and more slender than in C. abacurus. The specimen figured had 178 abdominal plates, and 39 pairs of subcaudal scales.

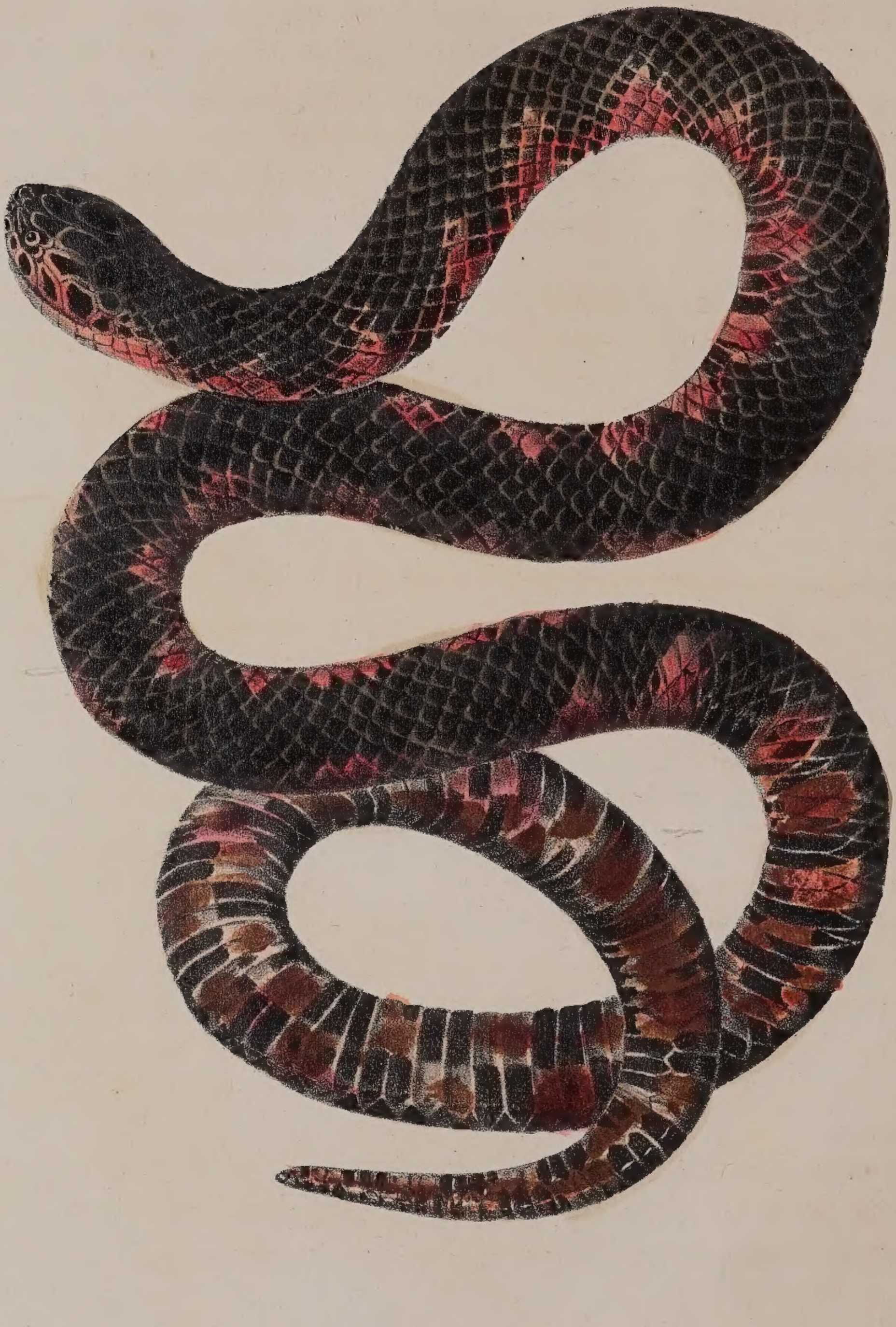
Colours. The head is dark blue: the marginal plates of both the upper and lower lip are of a bright lemon-colour, each with a dark blue spot in the centre; the throat is bright lemon-colour for about an inch and a half, when it becomes of a pale straw-colour. A vertebral line of red begins at the occiput and runs to the tail; on each side of this is another longer line of the same colour, reaching to the extremity of the tail; each of these lines is of the breadth of a single scale, and between them are broad bands of bluish-black, the breadth of three scales: beneath the inferior longitudinal red line is another band of bluish-black, including two scales and a half; and next is a third red band consisting also of two scales and a half; the margins of the scales being straw-colour, give a lighter appearance to the latter band. The plates of the abdomen are flesh-colour, with the posterior margin pale straw, and on each are two large rounded spots of indigo blue, forming a line of blue spots on each side of the abdomen: a third spot is sometimes present in the middle of the plates.

Dimensions. Length of the head, $\frac{9}{10}$ of an inch; breadth across the temples, $\frac{3}{4}$ of an inch; circumference, 3½ inches; length of head and body, 38 inches; tail, 5½ inches; total length, 3 feet 7½ inches.

Geographical Distribution. This Serpent is by no means uncommon in Carolina. I have often seen it on the banks of the Santee. Dr. Ravenel has procured me specimens from the Cooper river, and Dr. Wurdeman from Greenville, South Carolina.

Habits. This animal is found in swampy grounds and damp places, in holes in the earth, or under the stumps of old trees, but never takes to the water. It frequents the banks of rice fields, where it lies in wait for its prey, the large rat that infests them, injuring at once the rice and the banks by burrowing in the soil. Spite of this essential service, the universal prejudice against the Serpent tribe causes its destruction from all hands.

General Remarks. The Coluber erythrogrammus was first noticed by Palisot de Beauvois, who found it in the southern States, and communicated a specimen to Daudin. The latter has given a figure of a portion of this animal, and a detailed description; with which our specimen agrees in the main, but not altogether. Daudin gives "162 plates and 49 pairs of scales, and the tail one-sixth of total length,"—neither have I been able to find the "three rows of carinated scales on the back," or the peculiar conformation of the abdominal plates.



Coluber abacurus

23

Sera pinx^{t} On Stone by G. Lehman Lehman & Duval Lith^{rs} Philad^{a}

COLUBER ABACURUS.

Plate XXIII.

Characters. Head short, thick, as large as the neck, and not distinct; eyes and nostrils superior and near the snout: body bluish-black above; flanks marked with transverse bands of bright red; beneath red, with black spots disposed with some regularity: tail very short, thick, conical, rounded at the apex with a slight point, one-tenth of total length. Pl. 195—Sc. 34.

Description. The head is short, thick, a little flattened above, and not distinct from the neck. The vertical plate is short, broad and pentangular; the occipital plates are very large; the supra-orbital are small, nearly rectangular; the frontal plates are almost square, with the posterior external angle lengthened, to form a part of the orbit; there is but one anterior-frontal or nasal plate; the posterior orbital are two in number; the anterior orbital are wanting, and the loral is narrow and elongated; the rostral plate is very broad; the nostril plates are nearly rectangular. The mouth is small: the nostrils are latero-superior and near the snout; the eyes are small, also directed obliquely upwards, and placed near the snout; the pupil is black, and the iris gray with a tinge of red. The body is elongated and almost perfectly cylindrical, tapering only towards the commencement of the tail; the scales are all smooth, shining, broad, and obtuse at the apex, and even more uniform in size than in the preceding species. The tail is remarkably short, conical, terminating rather abruptly in a slight point.

Colours. The head above is dark blue, with the plates tinged with red at their junction: the marginal plates of the upper lip are reddish, each with a dark blue spot in the centre; most of those of the lower lip are likewise spotted. The whole superior surface of the back and tail is black; the sides are marked with about sixty transverse bands of bright red; these bands are sometimes continued across the abdomen, sometimes they are interrupted midway; and as they often terminate suddenly and have well defined margins, these spaces contrasting with the deep black of the other portions, give a tesselated appearance to the inferior surface of the body; this is most striking at the tail, where it resembles in no slight degree the ornamental borders found on the walls of Pompeii.

Dimensions. Length of the head, 1¼ inches; breadth of the head, 1$\frac{1}{10}$ inches; length of the head and body, 48 inches; tail, 5 inches; circumference, 3½ inches; total length, 4 feet 5 inches.

Geographical Distribution. I have seen this animal only in South Carolina; but Professor Green, of Philadelphia, has received it from the Mississippi, in the vicinity of New Orleans.

Habits. This Serpent is similar in its habits to the C. erythrogrammus; it is rare and shy, consequently little can be observed of it, except that it is altogether a land animal.

General Remarks. The C. abacurus is evidently very closely related to the preceding; both will probably be separated from Coluber when their anatomical characters shall be properly examined: the small size of the head, mouth and eyes, the superior position of the latter and of the nostrils, the absence of anterior orbital plates, and their subterranean mode of life, are striking characters. The C. erythrogrammus has been referred by Wagler to his genus Helicops, and indeed presents considerable analogy, even to the disposition of its colours, with the South American species.

END OF THE FIRST VOLUME.